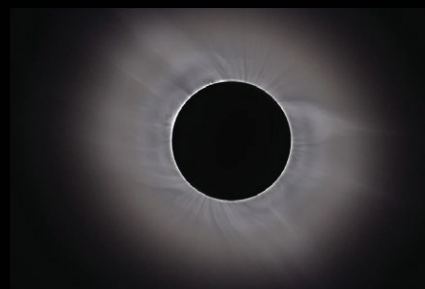


PRIMEFOCUS

Tri-Valley Stargazers



January 2017



Meeting Info

What:

Using your Eyes and Your Camera to Get the Most Out of Solar Eclipses

Who:

Rob Hawley

When:

January 20, 2017
Doors open at 7:00 p.m.
Meeting at 7:30 p.m.
Lecture at 8:00 p.m.

Where:

Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

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January Meeting

Using your Eyes and Your Camera to Get the Most Out of Solar Eclipses

Rob Hawley

In 2017 totality only lasts for two minutes. During that time a lot happens. I will use my own experience (both good and bad) to help the participants get the most out of their eclipse experience whether you are going to just view it with your eyes or bring your portable observatory.

Rob has been active in local astronomy and astronomy outreach since 2002. He is currently active in both the Fremont Peak Observatory Association (where he is Treasurer) and in the Peninsula Astronomy Society. Since 1999 he has been actively chasing the shadow of the moon, attending every eclipse (except for 2003 in Antarctica). Along the way he has learned a lot on how to take photographs (and how not to take them). 2017 will be his 14th.



Image Caption: Rob Hawley at the March 20, 2015 Total Solar Eclipse at Svalbard, Norway.

For those who cannot attend the material I will be presenting (and more) are in the YouTube movies linked from my website: robhawley.net

Member Show and Tell: If you were good last year...

If you are interested in amateur astronomy, Santa probably brought you a new gadget, book, program, or maybe even binoculars or a telescope for Christmas. Whoopee! Since they say it is better to give than receive, how about sharing a story about your new goodies. We are always looking for equipment or book reviews, show and tell stories, or wear that new astronomy T-shirt or bring that new eyepiece or telescope to the general meeting so we can all share, vicariously, in the spirit of Christmas. Most likely we can put you on the agenda at the last minute, but it would be helpful if you drop a note to president@trivalleystargazers.org so I can be sure everyone has time to "show and tell". Hope you had an astronomically awesome Christmas! ...Rich Combs, President

News & Notes

2017 TVS Meeting Dates

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

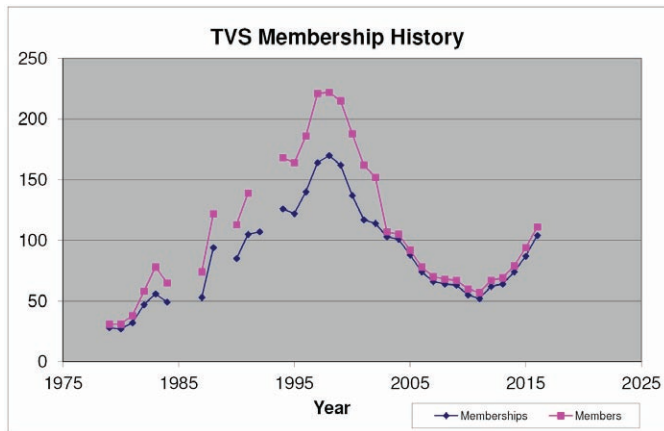
Lecture Meeting	Board Meeting	Prime Focus Deadline
Jan. 20	Jan. 23	
Feb. 17	Feb. 20	Jan. 27
Mar. 17	Mar. 20	Feb. 24
Apr. 21	Apr. 24	Mar. 31
May 19	May 22	Apr. 28
Jun. 16	Jun. 19	May 26
Jul. 21	Jul. 24	Jun. 30
Aug. 18	Aug. 21	Jul. 28
Sep. 15	Sep. 18	Aug. 25
Oct. 20	Oct. 23	Sep. 29
Nov. 17	Nov. 20	Oct.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

TVS Board

The 2017 TVS Board will have 7 members: Rich Combs, President; Eric Dueltgen, Vice President; Roland Albers, Treasurer; Joy Milsom, Secretary; Chuck Grant, Immediate Past President; and two At Large Members.

Money Matters

As of the last Treasurer's Report on 12/19/16, our club's checking account balance is \$15,336.47.



The club now has 111 members (including 7 lifetime members). This is our largest membership since 2002.

Dues are Due

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. The term of membership is one calendar year - January through December. Note: As an option, 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.

H2O Observatory Report

Observatory Director Chuck Grant has visited H2O three times in December. The solar panel, battery, and charge controller have been installed. The battery was charging via the panel when he last left. The roof disconnect and floor to mount cable remain to be finished.

TVS Volunteer Position Updates

Ron Kane has agreed to be the TVS Loaner Telescope manager, and has some great ideas for expanding the lending program including the possibility of adding a camera. Sulaiman Syad has agreed to be the contact for the NASA Night Sky Network.

Mentoring

TVS will purchase 6 copies of the Astronomical League *Universe Sampler* books and sell them to any interested club members at cost at general meetings. The *Universe Sampler* is an ideal starting point, being a learn by doing project (no telescope needed) that takes one year to complete. If you submit your observations following the Astronomical League Program rules you will receive a certificate and pin. For more information see: <https://www.astroleague.org/al/obsclubs/univsamp/univsamp.html>

TVS will also purchase 2 copies of *Nightwatch* by Terence Dickinson, that will be lent out to club members.

Opportunity for Mt. Wilson Observing

Some of you may have noticed the article in the September Sky and Telescope about observing with the Mount Wilson 60" and 100" telescopes. Both telescopes are available from

News & Notes (continued)

April through December. Maximum group size is 18 for the 100 inch and 25 for the 60 inch, though smaller groups are suggested to minimize waiting time. Fees are \$950 for a half night and \$1,700 for a full night on the 60-inch, and \$2,700 half night and \$5,000 for a full night for the 100-inch. Divide by the number of observers for the per person cost. We might combine this with another club like the SJAA to reach an appropriate number of people. Imagine, next time someone says "What the biggest scope you've looked through?", you can say, casually, "Oh, a 100-incher." If you are interested send a note to: president@trivalleystargazers.org

Calendar of Events

Daily

What: One Giant Leap: A Moon Odyssey
Who: Chabot Exhibit
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Chabot Admission \$18 Adults, \$14 Youth, \$15 Seniors, Free for Members

Want to GET BEHIND THE CONTROLS of the original space roadster (a Mercury space capsule), see just how much rocket it took to put three men on the Moon and TRY YOUR HAND AT LANDING there just as it was done the first time?

And what a ride it was! Neil Armstrong admitted to taking a tiny step as a man, but acknowledged that for humankind together, it was a huge advance.

We didn't just go to the Moon, we brought some of it back to

Earth - Chabot has a piece of it! - A MOON ROCK FROM THE APOLLO 15 MISSION, 3.3 billion years old and still looking like it did when it was born.

See <http://www.chabot.space.org/exhibits.htm> for more information, or call (510) 336-7373.

January 9, 7:30pm

What: Earth in Human Hands: A Cosmic View of Our Planet's Past, Present and Future
Who: David Grinspoon, Planetary Science Institute
Where: California Academy of Science, 55 Music Course Dr., Golden Gate Park, San Francisco, CA
Cost: Advanced ticketing required. Academy members \$12, Seniors \$12, General \$15. Reserve a space online or call 1-877-227-1831.

What are we doing here on this planet? Can a deep-time and deep-space viewpoint help us gain the perspective to create a sustainable civilization? Informed by comparative planetology and a survey of the major transitions in Earth history, David Grinspoon will describe a taxonomy of planetary catastrophes meant to illuminate the unusual nature of the "Anthropocene," our current time of human-driven planetary changes, and reframe our environmental predicaments as part of a larger narrative of planetary evolution. This saga has now reached the pivotal moment when humans have become a major agent of global change, and geological and human history are becoming irreversibly conjoined. Is this a likely or even inevitable challenge facing other complex life in the universe? Possible implications for SETI (the search for extraterrestrial intelligence) will be considered, as well as the choices our civilization faces in seeking to foster a wisely

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Officers

President:
Rich Combs
president@trivalleystargazers.org
Vice-President:
Eric Dueltgen
vice_president@trivalleystargazers.org
Treasurer:
Roland Albers
treasurer@trivalleystargazers.org
Secretary:
Joy Milsom
secretary@trivalleystargazers.org

Volunteer Positions

Astronomical League Representative:
Dennis Beckley
alrep@trivalleystargazers.org
Club Star Party Coordinator:
Eric Dueltgen
coordinator@trivalleystargazers.org
Historian:
Hilary Jones
historian@trivalleystargazers.org
Loaner Scope Manager:
Ron Kane
telescopes@trivalleystargazers.org
NASA Night Sky Network Contact:
Sulaiman Syed
nnsn@trivalleystargazers.org
Newsletter Editor:
Ken Sperber
newsletter@trivalleystargazers.org
925-361-7435

Observatory Director/

Key Master:
Chuck Grant
h2o@trivalleystargazers.org
Outreach Coordinator:
Eric Dueltgen
outreach@trivalleystargazers.org
Potluck Coordinator:
Jill Evanko
potluck@trivalleystargazers.org
Program Director:
Rich Combs
programs@trivalleystargazers.org
Publicity Coordinator:
Joy Milsom
publicity@trivalleystargazers.org
Refreshment Coordinator:
Laurie Grefsheim
Webmaster:
Hilary Jones
webmaster@trivalleystargazers.org

Web & E-mail

www.trivalleystargazers.org
info@trivalleystargazers.org

TVS E-Group

So how do you join the TVS e-group, you ask? Just send an e-mail message to the TVS e-mail address (info@trivalleystargazers.org) asking to join the group. Make sure you specify the e-mail address you want to use to read and post to the group.

Calendar of Events (continued)

managed Earth.

See www.calacademy.org/events/benjamin-dean-astronomy-lectures for lecture and reservation information.

January 10, 12:00pm

What: The Late Veneer and Earth's Habitability
Who: Norm Sleep, Stanford University
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

Asteroid impacts were a hazard to any life on the Hadean Earth. A traditional approach to geochemical models of the asteroid impactors uses the concentration of highly siderophile elements including the Pt-group in the silicate Earth. These elements occur in roughly chondritic relative ratios, but with absolute concentrations <1% chondrite. This veneer component implies addition of chondrite-like material with 0.3-0.7% mass of the Earth's mantle or an equivalent planet-wide thickness of 5-20 km. The veneer thickness, 200-300 m, within the lunar crust and mantle is much less. The accretion of a large number of small bodies would provide comparable thicknesses to both bodies.

There are two traditional ways to explain the different veneers on the Earth and the Moon. One hypothesis is that the terrestrial veneer arrived after the moon-forming impact within a few large asteroids that happened to miss the smaller Moon. Several impacted, then likely boiled the ocean and exterminated any life. These impacts provided the water and oxidant inventory to the silicate Earth. Alternatively, most of the terrestrial veneer came from the core of the moon-forming impactor, Theia. The second hypothesis has the implication that the Moon contains iron from Theia's core. Tungsten isotopes, sulfur group elements, and halogens may help select the applicable mechanism.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

January 17, 12:00pm

What: Constraining the Evolution of a Delta Deposit on Mars from Orbit
Who: Tim Goudge, UT Austin
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

Decades of planetary exploration have revealed widespread evidence for ancient fluvial activity on the surface of Mars, including deeply incised valleys, paleolake basins, and an extensive sedimentary rock record. Acquisition of high-resolu-

tion remote sensing data of the martian surface (e.g., images and topography) over the past 5-10 years have allowed for quantitative analysis of the large-scale sedimentary structures of martian sedimentary deposits.

In this talk, Dr. Goudge will focus on a detailed study of the stratigraphic architecture and channel deposit geometries of the Jezero crater delta deposit and the paleolake in which it formed on Mars. This delta deposit is a representative example of fluvial stratigraphy on early Mars, and these results can help to improve our understanding of ancient martian fluvial activity.

For more information see: <http://www.seti.org/csc/lectures>, e-mail info@seti.org, or phone 650-961-6633.

January 23, 12:00pm

What: Exocomets: Now You See Them, Now You Don't
Who: Barry Welsh, UC Berkeley
Where: SETI Institute Colloquium, Microsoft Silicon Valley Campus (Galileo Room), 1065 La Avenida St., Mountain View, CA
Cost: Free

Minor bodies such as Kuiper Belt objects, comets, and asteroids constitute the rocky and icy debris left over from the planet building phase of our solar system. The existence of reservoirs of small rocky bodies (i.e., asteroids/planetesimals) in orbits around young stellar systems is now well established, with their presence being required by current (exo)planetary formation theories. The initial proto-planetary disks that contain the reservoir of dust and gas required to form (exo)planets are short lived ($\ll 1$ Myr) and thus the circumstellar debris disks observed around young stars of ages 10 – 50 Myr must be being continually replenished by collision and evaporation events amongst planetesimals. Present technology does not enable us to view images of these kilometer-sized infalling bodies, but the evaporation of gaseous products liberated from exocomets that occurs close to a star can potentially cause small disruptions in the ambient circumstellar disk plasma. For circumstellar disks that are viewed "edge-on" this evaporating material may be directly observed through transient (night-to-night and hour-to-hour) gas absorption features seen at rapidly changing velocities. Using high resolution spectrographs mounted to large aperture ground-based telescopes, we have discovered 15 young stars that harbor swarms of exocomets. In this lecture we briefly describe the physical attributes of comets in our own solar system and the instrumental observing techniques to detect the presence of evaporating exocomets present around stars with ages in the 10 – 100 Myr range. This work has particular relevance to the dramatic fluctuations in the flux of "Tabby's star," seen by the NASA Kepler Mission, that may be explained through the piling up

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Member Astrophotos



Image Caption: Kevin McLoughlin imaged the Pleiades (top) and the Rosette Nebula (bottom) from Hidden Hill Observatory on December 3rd, using a Nikon D610 with a Sigma telephoto lens set at 600 mm FL, f/6.3 and ISO 800. Eight (six) 2-minute exposures and one dark frame were combined with DeepSkyStacker for the Pleiades (Rosette Nebula). He recently learned that the reflection nebula surrounding the Pleiades isn't leftover material from their formation; it is an interstellar dust cloud that the cluster happens to be passing through as it orbits the galaxy (top). Unlike the Pleiades, the star cluster at the center of the Rosette Nebula was formed from the surrounding nebula; about 2500 young stars lie within this complex.

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

January

- 8-10 Sun- Mercury and Saturn ~7 degrees apart, low in the southeast (Dawn)
10 Tue Algol at minimum brightness for 2 hours centered at 6:19pm
12 Thu **Full Moon (3:34am)**
14 Sat The Moon shines near Regulus, with their separation increasing throughout the night
19 Thu **Last-Quarter Moon (2:13pm)**
19 Thu The Moon, Jupiter, and Spica form a compact triangle in the southeast (Predawn)
24 Tue Thin crescent Moon ~3 degrees to the upper-left of Saturn in the southeast (Dawn)
25 Wed Use binoculars to see the thin crescent Moon, with Mercury ~ 5 degrees below (Dawn)
27 Fri **New Moon (4:07pm)**
30 Mon Algol at minimum brightness for 2 hours centered at 8:04pm
31 Tue Waxing crescent Moon, Mars, and Venus form a triangle in the west-southwest (Dusk)

February

- 1 Wed Jupiter and Spica separated by less than 4 degrees (2.5 hours before sunrise)
3 Fri **First-Quarter Moon (8:19pm)**
5 Sun The waxing gibbous Moon lies left of Aldebaran (Evening)
10 Fri **Full Moon (4:33pm)**
10-11 Fri The Moon and Regulus move closer throughout the night
15 Wed The waning gibbous Moon, Jupiter, and Spica form an arc 6-8 degrees long (morning)

of swarms of exocomets in front of the central star.

For more information see: <http://www.seti.org/csc/lectures>,
e-mail info@seti.org, or phone 650-961-6633.

January 31, 12:00pm

What: How Stars Form
Who: Christopher McKee, UC Berkeley
Where: SETI Institute Colloquium, Microsoft Silicon Valley
Campus (Galileo Room), 1065 La Avenida St.,
Mountain View, CA
Cost: Free

No details available.

For more information see: <http://www.seti.org/csc/lectures>,
e-mail info@seti.org, or phone 650-961-6633.

February 6, 7:30pm

What: Detecting the Highest Energy Gamma Rays with
an Observatory Made of Water
Who: Brenda Dingus, Los Alamos National Laboratory
Where: California Academy of Science, 55 Music Con-
course Dr., Golden Gate Park, San Francisco, CA
Cost: Advanced ticketing required. Academy members

\$12, Seniors \$12, General \$15. Reserve a space
online or call 1-877-227-1831.

The High Altitude Water Cherenkov (HAWC) observatory, which is located at 14000' elevation in central Mexico, began operating in March 2015 and is detecting the highest energy gamma rays ever observed. These gamma rays come from supermassive black holes in distant galaxies as well as sources within the Milky Way galaxy, such as the winds produced by rapidly rotating neutron stars and the remnants of supernovae explosions. These sources are Nature's particle accelerators, and some produce particles with energies millions of times greater than man-made accelerators. The high energy gamma rays probe the astrophysics of the extreme gravitational and electromagnetic fields of these particle accelerators as well as providing a unique window to search for dark matter such as predicted in some high energy physics theories. In this talk Dr. Dingus will describe how this unique observatory works and what we are learning about astrophysics and high energy physics from the observations of HAWC.

See www.calacademy.org/events/benjamin-dean-astronomy-lectures for lecture and reservation information.

Big Science in Small Packages

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS (“minks”) is NASA's first CubeSat with a bona fide science mission.



Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares – eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The \$1 million original mission has been gathering observations since June. The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch

long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.



Image caption: Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. The second CubeSat is CADRE — short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation. Credit: ESA/NASA

If you'd like to teach kids about where the sun's energy comes from, please visit the NASA Space Place: <http://spaceplace.nasa.gov/sun-heat/>

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!



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.