

PRIMEFOCUS

Tri-Valley Stargazers



January 2018



Meeting Info

What: Going Deep — Challenging Observing Projects for the Intrepid Amateur

Who:
Steve Gottlieb

When:
January 19, 2018
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

Inside

News & Notes	2
Book Review	3
Calendar of Events	4
TVS Holiday Party	5
What's Up	6
NASA's Space Place	7
Membership/Renewal Application	8

January Meeting

Going Deep — Challenging Observing Projects for the Intrepid Amateur

Steve Gottlieb - Contributing Editor S&T

Is your observing experience getting stale? Do you find yourself looking at the same objects each year? Have you completed the Messier list and wonder what's the next step?

Refocus by working on advanced observing projects. Steve will discuss how to jump-start your observing by delving into Hickson Compact Groups, Local Group Dwarf Galaxies, Palomar Globulars, Abell Planetaries, Vorontsov-Velyaminov Interacting Galaxies, Extragalactic Globulars, Karachentsev Galaxy Triplets and more. He'll discuss his observations using several telescopes up to 48-inch aperture.



Image Caption: Steve Gottlieb setting up his 24" f/3.7 Starstructure at the 2017 Golden State Star Party.

Steve was a regular observer at the H20 site throughout the '80's and '90's. He recently completed a 35-year project to observe the entire NGC (roughly 7500 objects), a project that involved several trips to the southern hemisphere. His observations resulted in numerous historical corrections of the NGC as a member of the NGC/IC Project. His favorite deep sky objects are featured in Orion's "Deep Map 600" atlas and his website Adventures in Deep Space is a popular source of observing challenges for advanced amateurs.

Steve is a regular contributing editor for Sky & Telescope magazine and has written numerous observing articles for the column "Going Deep", which is the basis for this talk.

News & Notes

2018 TVS Meeting Dates

Below are the TVS meeting dates for 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
Jan. 19	Jan. 22	
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

Money Matters

As of the last Treasurer's Report on 12/18/17, our club's checking account balance is \$16,492.85.

TVS Volunteer Positions: Correction

Correction: Chuck Grant is the International Dark Sky Association Coordinator, and Ross Gaunt remains the NASA Night Sky Network Coordinator.

Outreach Star Party: Help Needed

Wednesday, January 10 at Gladys Poet-Christian School, 1701 S. Central in Tracy, set up at 6:00

Wednesday, January 31 at St. Bernard's School, 165 W. Eaton Ave. in Tracy, set up at 6:00

These star parties are being held in conjunction with the schools' Family Science Nights, so there will be other (indoor) science activities. We will start setting up 30 minutes before the events (as noted above), then have telescope/binocular viewing for 1.5 hours. Please contact Eric Dueltgen for more information.

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.

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 January 19 meeting.

Alien Dob Platform Donation to TVS by Dennis Beckley

TVS has received an equipment donation from Dennis, an equatorial platform for use with Dobsonian mount telescopes. We thank him for the donation and encourage members to check this out if you have a 'Dob' scope.

This platform is placed on the ground, aligned toward the Polaris, the base leveled and then your Dob scope is set on top. The platform top has the correct tilt for our latitude and the motor drive provides up to 60-75 minutes of polar-axis motion reducing manual positioning of your 'scope and increasing your viewing enjoyment as well!



Now my caveat, I haven't used it and the instructions are approximate but I'd bet there will be guidance on what to do on the Web, so if you become a user of this accessory then I may ask you to help the next person.

Thanks again Dennis! By the way, Dennis is our representative to the Astronomical League and he coordinates the

News & Notes (continued)

certificate and award program, whose challenges are a great way for creating goals to learn more about astronomy. Check it out - <https://www.astroleague.org/observing.html>

--Ron Kane, TVS Loaner Scope Manager

Free Astronomy Textbook: Review-K. Sperber

TVS President Rich Combs has brought to my attention that a free college-level introductory textbook, entitled "Astronomy," is available for download from openstax.org/details/astronomy (also see the p. 84 S&T August 2017 Focal Point article entitled "Student Aid"). The Senior Contributing Authors are Prof. Andrew Fraknoi of Foothill College (retired), David Morrison of NASA, and Sidney Wolff of the National Optical Astronomy Observatory (Emeritus), with contributions from about 70 other experts in astronomy. For many years Prof. Fraknoi taught introductory astronomy at Foothill College, where 900+ students took his course each year. Among his many awards, he received the Annenberg Foundation Prize of the American Astronomical Society, which is the highest honor in the field of astronomy education, and Asteroid 4859 was named in his honor.

The e-book consists of 30 chapters. Some of the material covered includes: The Birth of Astronomy, Orbits and Gravity, Radiation and Spectra, Origin of the Solar System, stellar evolution, Galactic Evolution, The Big Bang, and Life in the Universe. Given its publication date of October 2016, the book also includes information on the LIGO direct detection of gravitational waves from the coalescence of Black Holes. A quick look at the e-book, if that is possible given that it is 1200 pages in length, indicates that only basic math is occasionally used, such as Kepler's and Newton's Laws of Motion, and Newton's Universal Law of Gravitation, the Drake

Equation, among other simple calculations.

Each Chapter has clearly defined "Learning Objectives," while at the end of each chapter the main topics are summarized, including lists of reference materials, websites, apps, and videos. Additionally, there are suggested "Collaborative Group Activities, Review Questions, and Thought Questions." Much of the recommended reference material is in publications such as S&T, Astronomy, and Scientific American.

The book is well illustrated, with many beautiful images and diagrams, the latter of which clearly illustrate relevant concepts, such as "How Eratosthenes Measured the Size of the Earth, Retrograde Motion of a Planet beyond Earth's Orbit," the geometries of solar and lunar eclipses, crater formation, the rotation curve of the Milky Way Galaxy, etc.

I highly recommend "Astronomy" as a basic astronomical resource. The content should be accessible to high school students who have no astronomical experience. Given the scope of the material presented, there is surely new material that will pique the interest of those who have more astronomical experience.

The e-book is available as a .pdf in high- or low-resolution. I downloaded the high-resolution version, which is 154mb in size. It can also be downloaded as an iBook or for a Kindle device. The e-book download is free, but should you wish, you can make an optional donation to the Openstax publication effort, which is based at Rice University. Alternatively, you can order a hardcopy of "Astronomy" for \$58. The goal of Openstax is to make affordable textbooks available to college students. As you will see, there is a wide variety of publications available through the website, covering Science, Math, the Humanities, and the Social Sciences.

Officers

President:

Rich Combs
president@trivalleystargazers.org

Vice-President:

Eric Dueltgen
vice_president@trivalleystargazers.org

Treasurer:

Roland Albers
treasurer@trivalleystargazers.org

Secretary:

Ron Kane
secretary@trivalleystargazers.org

Past President:

Chuck Grant
past_president@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

Newsletter Editor:

Ken Sperber
newsletter@trivalleystargazers.org
925-361-7435

Observatory Director/

Key Master:

Chuck Grant
observatory@trivalleystargazers.org

Outreach Coordinator:

Eric Dueltgen
outreach@trivalleystargazers.org

Potluck Coordinator:

Jill Evanko
potluck@trivalleystargazers.org

Program Directors:

Lance Simms and Tina Chou
programs@trivalleystargazers.org

Publicity Coordinator:

Jim Theberge
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

January 13, 5:00pm-8:00pm

What: Astro-Imaging Workshop
Where: Coyote Valley Open Space Preserve, 550 Palm Ave., Morgan Hill, CA

SJAA is proud to sponsor this outdoor workshop to help those folks who are interested in learning about AstroPhotography and Imaging. Bring your questions, and/or your Canon or Nikon DSLR to connect to a working rig, and/or your complete astrophotography rig (battery powered).

For more information see: <https://www.meetup.com/SJ-Astronomy/events/243778387/>

January 23, 7:00pm

What: 1I/'Oumuamua, The First known Interstellar Visitor
Who: Matija Cuk, SETI Institute and Meg Schwamb, Gemini North Observatory
Where: SRI Conference Center, 301 Ravenswood Ave., Menlo Park, CA 94205 (Enter from Middlefield Rd.)
Cost: Free

1I/'Oumuamua, the first known interstellar small body, is probably an asteroid from another planetary system. Its discovery by Pan-STARRS1 offers a rare opportunity to explore the planetary formation processes of other stars, and the effect of the interstellar environment on a planetesimal surface. Since its discovery, astronomers around the world have raced to use ground-based and space-borne telescopes to collect information on its nature. Meg Schwamb, astronomer at the Gemini Observatory in Hawai'i and Matija Cuk, astronomer at the SETI Institute in Mountain View, will discuss 'Oumuamua, its color and shape in comparison with known solar system bodies, and its origin derived from its extremely elongated shape and its orbit. They will show that 'Oumuamua is one of the most important discoveries of the decade.

Matija Cuk (SETI Institute) received his Ph.D. degree from Cornell University in 2005. He uses computer simulations to study the past and present evolution of the orbits of the planets, moons and asteroids. His recent work focused on the origin of Earth's Moon, as well as the moons and rings of Saturn. In 2014 he was awarded the Harold Urey Prize for early career achievement from the Division of Planetary Sciences of the American Astronomical Society.

Meg Schwamb (Gemini Observatory, Hawai'i) researches how planets and their building blocks form and evolve. She is also involved in the Planet Four citizen science projects, which enlists the public to help study the seasonal processes of the Martian south pole and map the distribution of ridges on the Martian mid-latitudes. Meg also serves as co-chair of the Large Synoptic Survey Telescope's Solar System Science Collaboration. Meg was awarded the 2017 Carl Sagan Medal for Excellence in Public Communication in Planetary Science from the American Astronomical Society's Division for Plan-

etary Science.

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

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.

February 2, 6:00pm-10:00pm

What: \$5 First Fridays: Animation and Film Making
Who: You
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: \$5; <http://www.chabotspace.org/first-fridays.htm>

Each \$5 First Friday at Chabot is an exciting and immersive experience for all ages! Join us each month for hands-on activities and live demonstrations that are fun for the whole family. Each month there will be new things to explore! Some activities have limited capacity and are first come, first served.

Pre-purchase your tickets for \$5 First Friday at: <http://www.chabotspace.org/first-fridays.htm> or for more information, call (510) 336-7373.

February 5, 7:30pm

What: The Search for Life Beyond Earth
Who: Kathryn Bywaters, SETI Institute & NASA Ames
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.

To search for life beyond Earth, we first have to decide on where we should look. Several locations within our solar system have been identified that might be habitable. An ideal place to look might be the icy moons around Saturn and Jupiter with their liquid oceans. However, once we decide where to look for life we then need to determine what we will look for and how we will look for it. If there is life in this solar system, other than on Earth, it seems most likely that it will be in the form of microbes. But what if it doesn't look like life on Earth - how will we know when we find it?

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

TVS Holiday Dinner



The TVS Holiday Potluck Dinner was a great success, with nearly 50 attendees, likely an all-time record! With our Potluck Coordinator Jill Evanko not feeling well, Rich Combs prepared the Tri-tip Roast and the Turkey, and Roland and Jill Albers prepared the candied potatoes and mashed potatoes. With the other attendees bringing appetizers, salads, and

desserts, there was a nicely varied menu. After dinner a raffle was held, with Rich handing out the door-prizes to the lucky winners. Roland and Jill Albers, and Ross Gaunt were among those who purchased the raffle prizes. Numerous members assisted with the set-up and clean-up, before and after the dinner. The success of the dinner was a true club effort!

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

All times are Pacific Standard Time

January

- 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 0.5° apart, with the Moon 6° 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)**
- 24 Wed **First-Quarter Moon (2:20pm)**
- 27 Sat The Moon rapidly approaches Aldebaran, from about 1° away at 1am, and nearly occulting it when they set together just after 3am
- 31 Wed **Full Moon (5:27am)**
- 31 Wed Ceres at opposition, shining at 6.9mag, visible all night

February

- 1 Thu The Moon trails Regulus by about 5° (Evening)
- 1 Thu Algol at minimum brightness for 2 hours centered on 8:30pm
- 2-16 Fri Zodiacal Light visible toward the west (after Sunset)
- 7 Wed **Last-Quarter Moon (7:54am)**
- 8 Thu Antares, Mars, the Moon, and Jupiter from an arc from Scorpio to Libra (Dawn)
- 11 Sun Crescent Moon 2° above Saturn-which is 3° above the teapot in Sagittarius (Dawn)
- 15 Thu **New Moon (1:05am)**
- 19 Mon Algol at minimum brightness for 2 hours centered on 1:26am
- 23 Fri **First-Quarter Moon (12:09am)**
- 24 Sat Algol at minimum brightness for 2 hours centered on 7:06pm

Snowy Worlds Beyond Earth

By Linda Hermans-Killiam

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:



Mars

The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you’d find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA’s Mars Reconnaissance Orbiter took photos of the sand dunes around Mars’ north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.

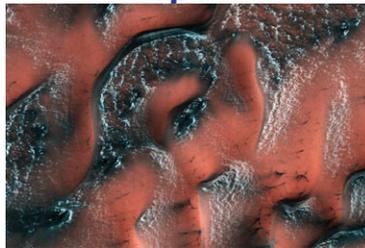


Image Caption: CO2 snow on Martian dunes. Credit: NASA MRO/JPL/University of Arizona

A Moon of Jupiter: Io

There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA’s Galileo spacecraft detected these sulfur snowflakes just above Io’s south pole. The sulfur shoots into space from a volcano on Io’s surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.



Image Caption: A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech

A Moon of Saturn: Enceladus

Saturn’s moon, Enceladus, imaged by NASA’s Cassini spacecraft (right), has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part



of Saturn’s rings. The water vapor comes from a heated ocean which lies beneath the moon’s icy surface. (Jupiter’s moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.

A Moon of Neptune: Triton

Neptune’s largest moon is Triton. It has the coldest surface known in our solar system. Triton’s atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.

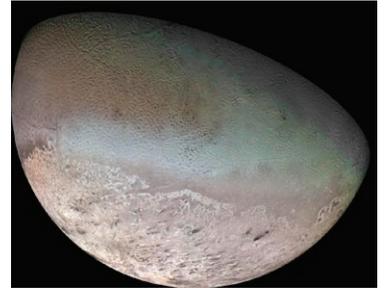


Image Caption: Voyager 2 captured this image of Triton. The black streaks are created by nitrogen geysers. Credit: NASA/JPL/USGS

Pluto

Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.

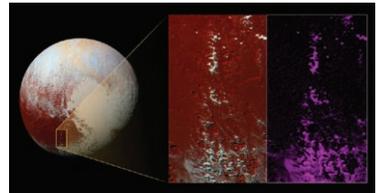


Image Caption: The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto. Credits: NASA/JHUAPL/SwRI

Beyond Our Solar System

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It’s nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet’s upper atmosphere. On the cooler side of Kepler-13Ab that faces away from its host star, the planet’s strong gravity might cause the titanium oxide to fall down as “snow.”



Image Caption: An artist’s illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)

Want to learn more about weather on other planets? Check out NASA Space Place: <https://spaceplace.nasa.gov/planet-weather>



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.