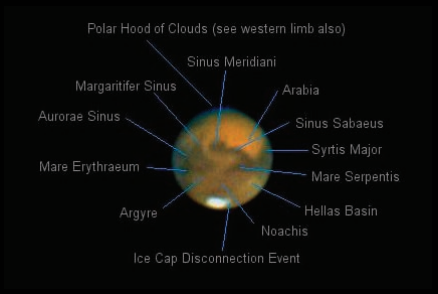
PRIMEFOCUS

Tri-Valley Stargazers



October 2020

Meeting Info:
Solar System Dynamics and the Martian Dust Storm of 2018

Who:
Jim Shirley, NASA JPL

When:
October 16, 2020
Meeting at 7:30 p.m.
Lecture at 8:00 p.m.

Where:
Virtual Meeting using: Zoom*
See the April or May issue of PrimeFocus for info on getting connected using Zoom.

Inside

October Virtual Meeting Using "Zoom*"

Solar System Dynamics and the Triggering of the Martian Planet-Encircling Dust Storm of 2018

Jim Shirley, NASA Jet Propulsion Laboratory

The Martian planet-encircling dust storm of 2018 began as a vigorous regional storm, localized within the Acidalia storm track, in early June of 2018 (Ls~185°). In typical Martian regional dust storms, dust may be lifted to altitudes of up to about 45 km; however, in the triggering regional storm of 2018, dust was lofted quite rapidly to altitudes above 70 km. Mars Climate Sounder observations obtained during the earliest days of the storm document the presence of an intensified, regional-scale, meridional overturning circulation at that time. We will review and highlight the MCS observations that support this conclusion.

The strengthened Hadley circulation revealed by the MCS observations is consistent with predictions made in earlier theoretical and modeling studies of orbit-spin coupling. The orbit-spin coupling hypothesis describes and quantifies an exchange of angular momentum between the "reservoirs" of the orbital motion and the rotational motion of a planet. In this process, the angular momentum of a planetary atmosphere may be intermittently augmented, or diminished, by torques arising due to the coupling. We will briefly describe both quantitative and qualitative aspects of the hypothesis. The deterministic nature of solar system dynamics enables the development of forecasts for future Martian dust storm seasons.

Recent work has shown that Martian global-scale dust storms preferentially occur at times when: 1) Mars is gaining orbital angular momentum, during the southern summer dust storm season, and 2) when the orbit-spin coupling torques are changing most rapidly. These two triggering modes account for the seasonal timing of all of the known Martian global-scale dust storms of the historic record since 1877. We will briefly review pertinent results of two century-long Martian global circulation model simulations that identify the expected consequences of the torques acting on the large-scale circulation of the Martian atmosphere. A strengthening of atmospheric meridional overturning circulations was noted, prior to simulated GDS events, in previous modeling studies. The inclusion of orbit-spin coupling torques within Martian global circulation models clearly brings about improved correspondence between numerical modeling results and atmospheric observations.

Bio: Jim Shirley has spent the past quarter-century working as a planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena, California. His most recent research has focused on the causes and consequences of global dust storms on Mars. Jim is also recognized as an authority on the surface geology and composition of Jupiter's moon Europa, having authored or co-authored 10 published scientific studies on that topic. He has also published scientific studies of the Sun and solar physics, of the Earth's atmosphere, and of large earthquakes and moonquakes. Jim holds degrees from Berkeley and from CSUN, where he completed an interdisciplinary program in geology and physics in 1995.

News & Notes

2020 and 2021 TVS Meeting Dates

Below are the TVS meeting dates for 2020. 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**
Oct. 16	Oct. 19	
Nov. 20	Nov. 23	Nov. 06
Dec. 18	Dec. 21	Dec. 04
Jan. 15	Jan. 18	Jan. 01
Feb. 19	Feb. 22	Feb. 05
Mar. 19	Mar. 22	Mar. 05
Apr 16	Apr. 19	Apr. 02
May 21	May 24	May 07
Jun. 18	Jun. 21	Jun. 04
Jul. 16	Jul. 19	Jul. 02
Aug. 20	Aug. 23	Aug. 06
Sep. 17	Sep. 20	Sep. 03
Oct. 15	Oct. 18	Oct. 01
Nov. 19	Nov. 22	Nov. 05
Dec. 17	Dec. 20	Dec. 03

TVS Election: Nominations

The annual election of club officers will occur at the November club meeting. During October we ask the club membership for nominations. The positions open for nomination are President, Vice President, Treasurer, and Secretary. This year we have two positions open where the seated member is not running for re-election: President and Treasurer. These are vital positions which must be filled before going into 2021.

If you would like to lead this club, or help us by keeping the books, please contact Eric Dueltgen (vice_president"at"trivalleystargazers.org), Ross Gaunt (secretary"at"trivalleystargazers.org), or any club officer. Please consider helping the club to move forward.

Please see your email from TVS (dated October 7) that outlines the duties of the elected club officers.

Money Matters

As of the last Treasurer's Report on 09/21/20, our club's account balance is $29,349.97. This includes contributions to the H2O Rebuild fund.

TVS Observatory Rebuilding Fund

The TVS donations campaign to rebuild the observatory at H2O has been highly successful, exceeding $39,000 dollars from more than 200 people in one month. This exceeds our goal of $30,000. Multiple avenues for making donations were established, including via gofundme CHARITY, PayPal, mail in checks to TVS, and Benevity matching corporate donations. We have received generous monetary donations from people across the globe, including from some in tribute to loved ones who have passed away. Numerous astronomy clubs have also contributed monetary gifts, including The Astronomical Association of North California, the Celestron C22 Mobile Observatory, Cloud Break Optics, the Eastbay Astronomical Society, the Fremont Peak Observatory Association, the Mount Diablo Astronomical Society, the Sacramento Valley Astronomical Society, and the San Mateo County Astronomical Society.

Nearly a dozen equipment donations have been offered to TVS! Stellarvue, a northern California telescope and eyepiece maker, has donated to TVS one of their in-house manufactured premium eyepieces, an Optimus 13.5mm 100 degree field of view eyepiece to help replace those lost at H2O in the fire. Numerous other telescope/mirror donations in the 14" to 24" class have been offered to TVS, plus a Celestron mount, but details and conditions for exchange need to be worked out.

In the rebuilt observatory, TVS is planning to recognize all of the donors who have given so generously to our goal of recovery. Through their contributions, TVS is poised to provide a leading edge facility that will serve TVS and enable enhanced public outreach for decades to come.

TVS Welcomes New Members

TVS welcomes new members Steve Banbury, Jesse Burns, Aden Cavalcanti (S), David Churlik, Frank Di Maulo, Matthew Di Maulo (S), Venkatesha Murthy, Richard Newell, Keith Primdahl, Kiran Reyes (S), and Ron Ybaara. Please say hello and chat with them during our Zoom meetings.

H2O and Del Valle Sites Open for Observing

H2O is open for those who want to bring their own scopes to observe. Please use levels 2 and 3 for parking and observing. Level 1 has been cordoned off. Please do not enter the restricted area for your safety. Though this area has been sweep numerous times with a magnetic broom, it is possible that nails remain in the area. We already disposed of a nearly full 5 gallon bucket of nails.

The Del Valle observing site is open. Please notify both the Park Supervisor and the East Bay Parks Police Dispatch office (phone #s given in your User Agreement) at least 24 hours before you plan on using the site.

Please see the August newsletter for the COVID-19 restrictions that the club has adopted to ensure the safety of our members.

New TVS Del Valle Coordinator

David Wright has kindly agreed to take on the position of Del Valle Coordinator. He succeeds David Feindel, who prior to that also served as club treasurer. We thank David Feindel for his service to the club and we wish him well on his relocation to the east coast.

Header Image: Mars imaged on September 6, 2003 using a Takahashi FS-102 at f/8 with a 5x TeleVue Powermate, an Astronomik IR filter, and a Phillips ToUcam. Credit K. Sperber

TVS Tesla Vintners Club Star Party: October 17

We are pleased to announce that we will hold a Club Star Party on Saturday, October 17 beginning at 6pm at Tesla Vintners. Only Club members and their guests may attend. This may be the only star party for us this year but it is a good area for unobstructed viewing, generally good dark sky levels and access to the winery bathroom. You'll be able to talk with others - properly distanced and covered - which will be better than Zoom!

Location: Tesla Vintners, 5143 Tesla Rd, Livermore, CA 94550

Set-up: Starts at 6pm - sunset is about 6:26pm - we want you to be set up before dark

Because of COVID-19 we have established special conditions on those attending since this is also place of business. We don't want anyone getting sick so we need to appropriate controls. Here are our requirements:

a. No member or individual within their social bubble is to attend the group event if they are feeling ill or know they have been exposed to COVID-19.

b. Properly-worn facemasks are required at all times.

c. Participants are required to arrive before dark to facilitate their parking and set up activities with minimum interference to others. Arriving at dark or later is discouraged.

d. Members set up and operate their equipment with a car's-length separation between them.

e. Equipment is not to be shared and a minimum of 6 feet of separation with masks is required for discussions between participants.

f. The site owner's bathroom is open for use, members will sanitize their hands before use and sanitize their hands and the touch surfaces after use. A final sanitizing will be performed before ending the event.

g. Only club members and those within their respective social bubble are allowed to participate.

h. Members may be turned away if the event area becomes too crowded.

So, the recap - don't come if you've been exposed or are not feeling well, stay at least 6 feet from others and properly wear a mask at all times. Use your own equipment and don't share.

Hope to see you there! This provides an opportunity to work on the TVS Autumn Observing Program list.

Outreach Star Party Schedule

Cancelled through October.

Contact Eric Dueltgen if you are interested in participating in future events (outreach"at"trivalleystargazers.org).

TVS Loaner Scope Program Donation

TVS wants to thank club member Larry Shaw for his donation of a Meade 8-inch LX-3 SCT with a number of accessories including a manual guide adaptor for photography and a lightweight equatorial mount with motor drive that will be useful for widefield camera imaging. These items have been well cared for and are a great donation. Both the SCT and small mount are now part of the hardware loans for club members. Thank you Larry!

Contact telescopes@trivalleystargazers.org for loan requests.

Officers

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info@trivalleystargazers.org

TVS E-Group

To join the TVS e-group 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.

Dual Band Filters and the Soap Bubble Nebula By Paul Caffrey

We are all drawn to this crazy hobby for different reasons. I am drawn to astronomy and in particular astrophotography because of the technical challenges of equipment and planning. Each month, as the new moon period approaches, I spend some time deciding what my observing campaign will be, where I am with my equipment, and what the next appropriate target might be given my equipment roadmap. For the past few months I have been using my 8 Inch SCT at f/10 and have recently found that off-axis guiding does indeed solve a lot of the inherent issues of long focal length astrophotography, but that might be a topic for another article. Suffice to say that I was looking for a suitable object to capture at 2000 mm focal length, so a relatively small object, but bigger than a typical planetary nebula such as M57. I was attending a Zoom meeting with one of the local imaging groups and marveling at the wonderful images others were taking with very expensive monochrome imagers using narrow-band filters. One member presented a fantastic image of the Soap Bubble Nebula, PN G75.5+1.7, a planetary nebula in Cygnus, and I instantly knew that was my next target.

The Soap Bubble is a very faint object (it typically won't show up in your individual sub-exposures) and I was wondering if I could capture this with my one-shot color (OSC) imager, the ZWO ASI 294 MC Pro. I was also wondering if one could use a dual-band filter with the OSC imager to bring out fainter detail that others were getting with mono imagers and narrow-band filters. So I went out to H2O on the nights of 7/22 and 7/23 and captured 25 X 900 second exposures both nights, on 7/22 with the obligatory IR-Cut filter and on 7/23 with the ZWO Duo-Band filter.

There was no soap bubble visible in the first image (see the top figure on p.5). There is some nebulosity visible but not a lot of Hα. The second image (see the bottom figure on p.5) shows a lot more Hα and the soap bubble is visible with the aid of the dual band filter, and it is centered within the field of view thanks to the marvel of plate-solving. So the conclusion I make is that dual band filters, although they are targeted towards use in light polluted applications, can indeed bring out faint detail from a dark sky image.

Calendar of Events

October 14, 7:00pm

What: The Hunt for Dark Matter in the Universe: New Experiments
Who: Dr. Tom Shutt, Kavli Institute, Stanford University
Sponsor: Silicon Valley Astronomy Lecture
Online: http://www.youtube.com/SVAstronomyLectures

Astronomers today understand that the universe is full of a mysterious substance they call "dark matter" (because it doesn't give off any light or other radiation we can detect.) Dr. Shutt will discuss the motivation behind the world-wide effort to test the idea that dark matter is in the form of particles as small as a neutrino but as heavy as an atom. He will describe the experiment he is involved with, that uses 7 tons of liquefied Xenon to measure how these particles interact with normal matter. This LUX-ZEPLIN Experiment will begin taking data shortly and should provide the most sensitive test yet for this elusive ingredient of the universe.

October 22, 10:00am

What: Radio Astronomy: The End of Big Dishes?
Who: Dr. Cherry Ng and Dr. Evan Keane
Sponsor: SETI Institute
Online: REGISTRATION REQUIRED; https://www.eventbrite.com/e/radio-astronomy-the-end-of-big-dishes-tickets-124468092415

Big-single dish radio astronomy observatories such as the 305-m Arecibo Observatory and the 500-m FAST (Five-hundred-meter Aperture Spherical Telescope) have made key breakthroughs in science, including the discovery of the first extrasolar planets. Recently, interferometric telescopes such as MeerKAT in South Africa, ASKAP (Australian Square Kilometre Array Pathfinder), and CHIME (Canadian Hydrogen Intensity Mapping Experiment) have opened up new observing windows. These experiments are all precursor to the SKA (Square Kilometer Array), whose construction will begin in 2021 and is expected to be the most sensitive radio telescope ever built.

October 24, 7:30pm

What: N~1: Alone in the Milky Way
Who: Dr. Pascal Lee
Sponsor: Wonderfest and the Mt. Tamalpias Astronomy Program
Online: https://www.youtube.com/wonderfestscience

The Drake Equation famously "quantifies our ignorance" regarding the number, N, of technological civilizations in our galaxy. Even though planets are plentiful, and even though life may be a natural — even common — product of cosmic chemistry, we may truly be the only galactic civilization capable of interstellar communication. I.e., perhaps N~1.

October 30, 7:00pm

What: Spooky Science Show
Who: Staff
Sponsor: Chabot Space and Science Center
Online: https://chabotspace.org/events/events-listing/

If there's something strange in your neighborhood, who you gonna call? Scientists! Join us on Facebook Live for our variety show all about spooky science. Tune in for exciting science demos led by our Galaxy Explorers, learn how to make your own Halloween candy and witches brew and hear scientific explanations for things that go bump in the night. Science is

continued on p.6

Dual Band Filters and the Soap Bubble Nebula By Paul Caffrey

Image Captions: Top: Soap Bubble 25 X 900 seconds IR-Cut Filter Meade 8 Inch Lx200 @F10, Bottom: Soap Bubble 25 X 900 seconds Zwo Duo-Band Filter Meade 8 Inch Lx200 @F10. All images taken at H20 by Paul O. Caffrey. See his article on p.4.

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

All times are Pacific Daylight Time Until November 1 at 2am; PST thereafter

October

11	Sun	The Moon is <2° from M44, the Beehive Cluster (Morning)
13	Tue	Mars reaches opposition (Visible all night)
14-	Wed-	For the rest of the month the Zodiacal light is visible in the east from a dark site, beginning about 2 hours before morning twilight
14	Wed	Venus rises in the east followed by the thin crescent Moon (Dawn)
16	Fri	New Moon (12:31pm)
20	Tue	Algol shines at minimum brightness for 2 hours centered on 11:40pm
21	Wed	The Orionid meteor shower peaks in the early morning
22	Thu	The Moon, Jupiter, and Saturn form a triangle in the south (Dusk)
23	Fri	First-Quarter Moon (6:23am)
23	Fri	Algol shines at minimum brightness for 2 hours centered on 8:29pm
29	Thu	The Moon and Mars are ~4° apart (Evening)
31	Sat	Full "Blue" Moon on Halloween! (7:49am)

November

1	Sun	Daylight Savings Time Ends (2am)
2	Mon	The Moon is 4° from Aldebaran (Evening)
8	Sun	Last-Quarter Moon (5:44am)
9-	Mon-	Through November 21, the Gegenschein visible from a dark site after 11pm (see November S&T, p. 49)
12	Thu	The Moon, Venus, and Spica form a curve 12.5° long with Mercury to the lower left: east-southeast (Dawn)
12	Thu	Algol shines at minimum brightness for 2 hours centered on 9:11pm
13	Fri	Thin Moon, Venus, Spica, and Mercury form a trapezoid (Dawn)
14	Sat	New Moon (9:07pm)
16	Mon	Venus, Spica, and Mercury visible in the east-southeast (Dawn)
17	Tue	The Leonid meteor shower peaks in the early morning
18	Wed	The Moon, Jupiter, and Saturn form an arc 10° long (Dusk)
19	Thu	The Moon, Jupiter, and Saturn form a triangle (Dusk)
21	Sat	First-Quarter Moon (8:45pm)

Calendar of Events (continued)

so fun… it's scary!

Everyone is invited to participate in our spooky fashion show. Use the hashtag #chabotspookyscience to tag us in your photos of your awesome costumes! We will post a slideshow of all of our fashion show participants at the end of the program!

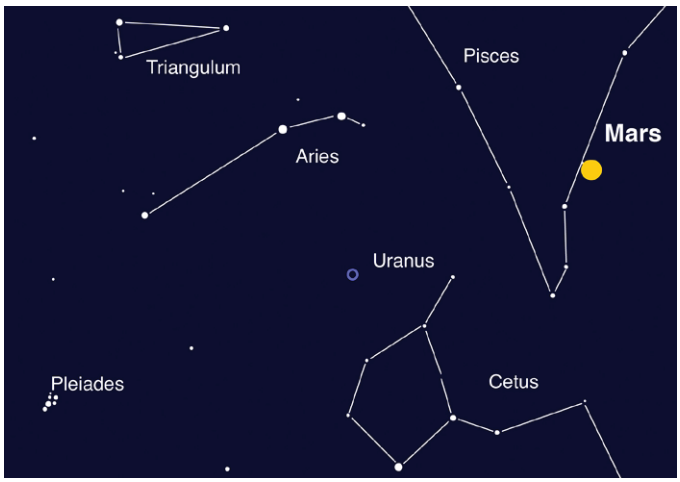
To receive a notification when the talk begins, make sure to "Like" the Chabot Space and Science Center Facebook page. Watch on YouTube: https://youtu.be/vZJTlBLGfvM

NASA Night Sky Notes

Summer Triangle Corner: Altair

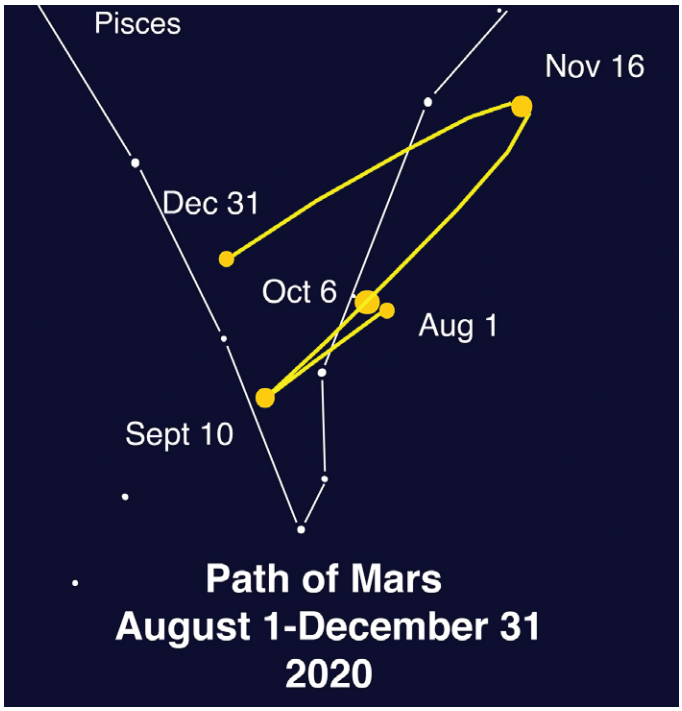
By David Prosper

October is a banner month for Mars observers! October 6 marks the day Mars and Earth are at closest approach, a once-every-26-months event. A week later, on October 13, Mars is at opposition and up all night. Mars is very bright this month, and astronomers are eager to image and directly observe details on its disc; however, don't forget to look at the space around the planet, too! By doing so, you can observe the remarkable retrograde motion of Mars and find a few nearby objects that you may otherwise overlook.



Caption: In early October you will find Mars in the constellation Pisces. If you are observing Mars, use the same eyepiece to check out Uranus's tiny blue-green disc, located in Aries.

Since ancient times, Mars stood out to observers for its dramatic behavior. Usually a noticeable but not overly bright object, its wandering path along the stars showed it to be a planet instead of a fixed star. Every couple of years, this red planet would considerably flare up in brightness, for brief times becoming the brightest planet in the sky before dimming back down. At these times, Mars would also appear to slow down its eastward motion, stop, then reverse and head westward against the stars for a few weeks, before again stopping and resuming its normal eastward movement. This change in the planet's movement is called "apparent retrograde motion." While all of the planets will appear to undergo retrograde motion when observed from Earth, Mars's retrograde appearances may be most dramatic. Mars retrograde motion in 2020 begins on September 10, and ends on November 16. You can observe its motion with your eyes, and it makes for a fun observing project! You can sketch the background stars and plot Mars as you observe it night after night, or set up a photographic series to track this motion. Does the planet move at the same rate night after night, or is it variable? As you observe its motion, note how Mars's brightness changes over time. When does Mars appear at its most brilliant?



Caption: The retrograde path of Mars during the last five months of 2020. October 6 is the day of closest approach of Earth and Mars, "just" 38.6 million miles apart. Images created with help from Stellarium: stellarium.org

NASA has tons of great Mars-related resources! Want to know more about apparent retrograde motion? NASA has an explainer at: bit.ly/marsretromotion. Find great observing tips in JPl's "What's Up?" videos: bit.ly/jplwhatsup. Check out detailed views with NASA's HiRISE satellite, returning stunning closeups of the Martian surface since 2006: hirise.lpl.arizona.edu. NASA's Curiosity Rover will be joined in a few months by the Perseverance Rover, launched in late July to take advantage of the close approach of Mars and Earth, a launch window that opens two years: nasa.gov/perseverance. Calculate the ideal launch window yourself with this handy guide: bit.ly/marslaunchwindow. The Night Sky Network's Exploring Our Solar System handout invites you to chart the positions of the planets in the Solar System, and NSN coordinator Jerelyn Ramirez recently contributed an update featuring Mars opposition! You can download both versions at bit.ly/exploresolarsystem. Young astronomers can find many Mars resources and activities on NASA's Space Place: bit.ly/spaceplacemars. Here's to clear skies and good seeing for Mars's best appearance until 2033!

This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

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

Tri-Valley Stargazers Membership Application

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. Note: NEW memberships initiated after October 1, 2020 will be good through 2021!!!

_____ Student member ($10). 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): Must be 18 or older.

_____ 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.

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 except as detailed in our Privacy Policy (http://www.trivalleystargazers.org/privacy.shtml).

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