



**SVAS** Vol.74 No.6\* Nov-Dec, 2017  
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**OBSERVER**

Sacramento Valley Astronomical Society

Founded in 1945

**Just a Small Shadow!**  
**Great American Eclipse**  
**August 21, 2017**



**Happy Holidays!**

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# SVAS Current Event Calendar



**Nov 17, Friday, 8:00pm, SVAS General Meeting**

Arcade Sacramento Public Library, 2443 Marconi Ave. Board meets at 6:30, at Arcade.



**Nov 18, Sat, Star Party at Blue Canyon**

Weather permitting.



**Dec 15, Friday, 8:00pm, SVAS General Meeting**

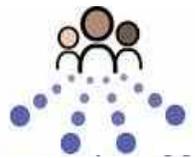
Arcade Sacramento Public Library, 2443 Marconi Ave. Board meets at 6:30, at Arcade.



**Dec 16, Sat, Star Party at Blue Canyon**

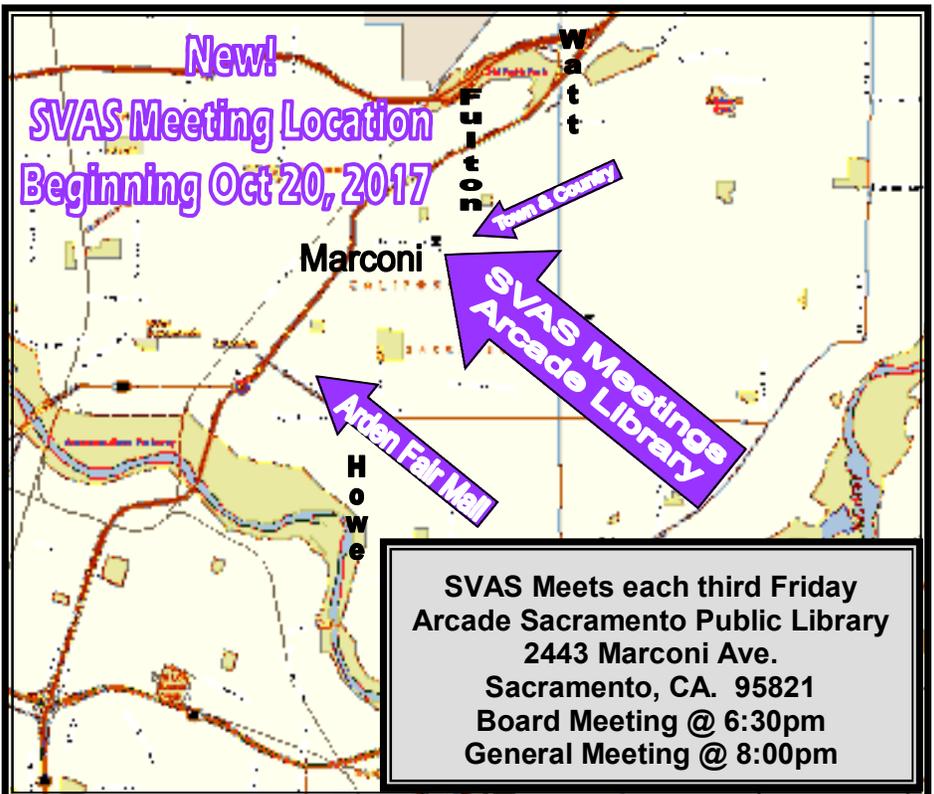
Weather permitting.

***\*\*Please visit SVAS.Org for contact Information\*\****



**Community  
Star Parties**  
Contact Wayne Lord

New!  
SVAS Meeting Location  
Beginning Oct 20, 2017



SVAS Meets each third Friday  
Arcade Sacramento Public Library  
2443 Marconi Ave.  
Sacramento, CA. 95821  
Board Meeting @ 6:30pm  
General Meeting @ 8:00pm



**Blue Canyon**

Nov 18  
Dec 16



**New Moon**

Nov 17  
Dec 17

# SVAS Guest Speakers

Speaker Seeker  
Fera Zamani  
SVAS Board member



Fera just announce she will be stepping down from Speaker Seeker and the SVAS Board, after December this year. She has done a fantastic job, and we will miss her great smile and wiliness to get things done! I have her promise that she will remain a SVAS member, and possibly return sometime soon to the rigors of running the SVAS. Thank you Fera!!

**Well, we are fresh out of speakers for November and December. Fera and I came up with an idea, actually the Nevada County Astronomers came up with it for their November meeting, to invite members and friends to give short talks about their Great American eclipse experience. Walt liked the idea, and thought we should limit it to four talks of about 15 minutes each. Please let Fera or myself know if you would like to share your Great American Eclipse!**

As you now know, our future meetings will be held at the Arcade Library. We had such a great time hosting Dirk Verdoorn, the KCRA Channel 3 weatherman. He talked about Space Weather and his Idaho Eclipse Experience for about 30 minutes, and then opened up to our questions. We ask questions for another half hour at least, questions from Global Warming to weather accuracy, to and my final request of a Mars weather report for the upcoming very close approach this July. We definitely need a forecast of the dust storms, so we can best plan our observing.

2017 has been another great year for the SVAS! Come join us at the SVAS monthly meetings, now held at a convenient central location! Be part of making our club great!





# SVAS

# Sunday FunDay

Sunday, September 24th  
Rusch Park  
11:00am - 3:00pm



SVAS Observer



Well, with so many photos I didn't leave very much room to talk, please don't be too happy about that! Sunday FunDay at Rusch Park was a huge success, and the new location towards the west of the park worked out fantastic. We were right off the main pathway to all the events, which were arranged in a circular pattern. The trees offered more shade, but not too much to interfere with solar observing. Countless people viewed through our scopes, I set mine up near the walkway and enjoyed extra heavy traffic all day. I don't think I sat down for more than ten minutes, my lunch break was broken into three parts! There was a great, huge, food court, but not enough time to wait for an order! I'm glad I brought lots of cold water, and a Costco salad. Many kudos go out to Kevin Normington, Wayne Lord, Jerry Hilburn, Walt Heiges, myself (Lonnie Robinson), and one other potential new SVAS member (sorry, I didn't write down his name).

Plan on attending next year, we can always use more members and or scopes. H-Alpha scopes are in short supply, and the sunspot activity, for white light filters, is at the low part of the 11 year cycle.

Observer Editor

# School Star Party Report



Theodore Judah Elementary  
*Building a path to success*



**Plastic  
Cups**



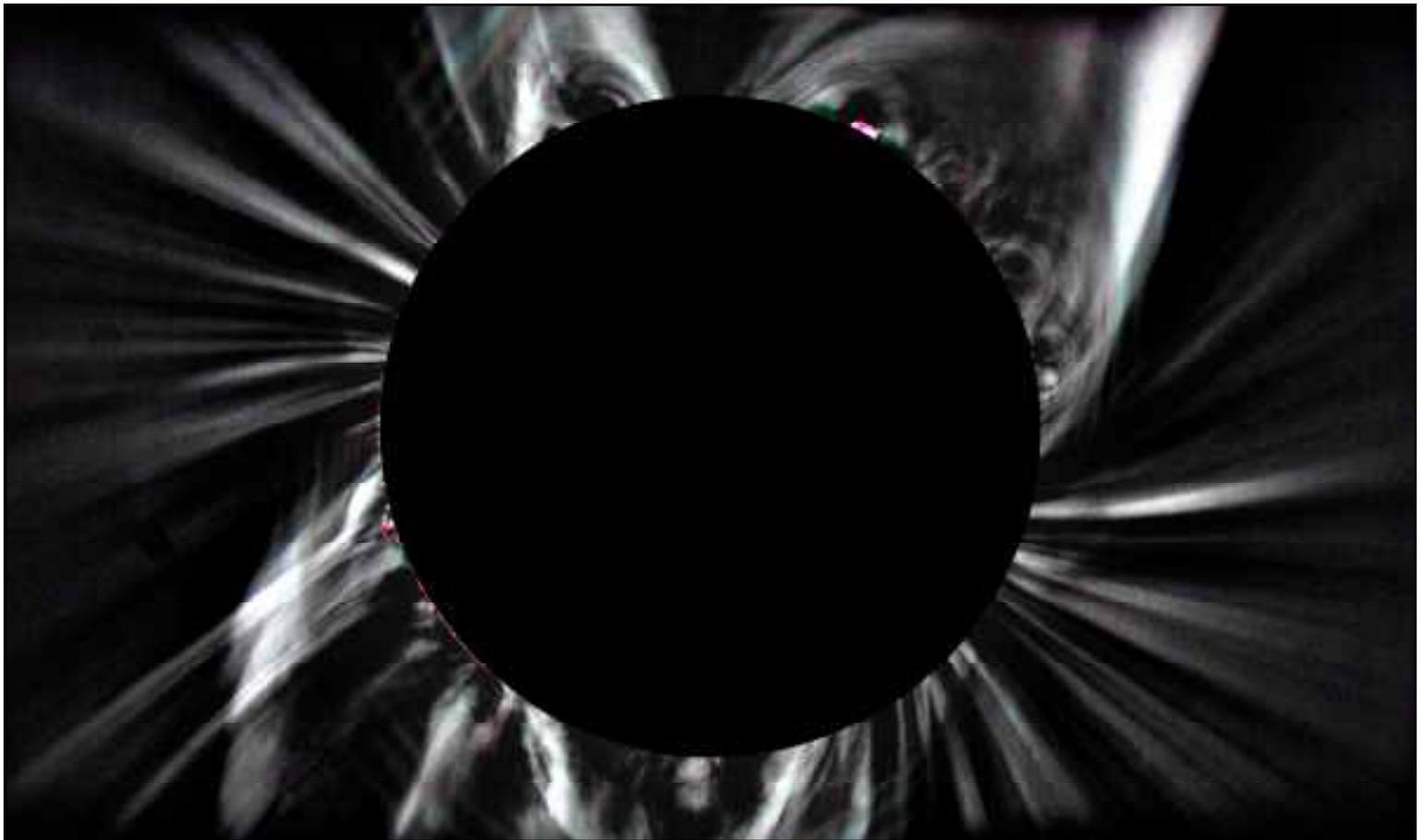
Lonnie Robinson, Jim Carvalho and I (Wayne Lord) represented SVAS at the Theodore Judah Elementary STEM Fair in October. This was a well-organized event for the whole school, which was broken into several sessions, 9AM - 10AM

and 10AM - 11AM. A number of other organizations were there to support the Science, Technology, Engineering and Math theme. The students were given "passports" which they had stamped at each station. As seems to be the case with this type of event, many of the students just wanted to get their passport stamped and move on to the next station, but a significant number of the rest stopped to ask questions and look through our telescopes.

Since the Sun was featureless at this time, Jim C. and I provided an alternative by aiming at the daytime moon, Jim with his 10" Dob and I with the SVAS 8" Celestron, while Lonnie had his 8" with a white-light filter and Jim had his Coronado aimed at the sun. The Coronado had by far the most interesting views, since there was quite a bit of activity visible in it despite the lack of visible sunspots.

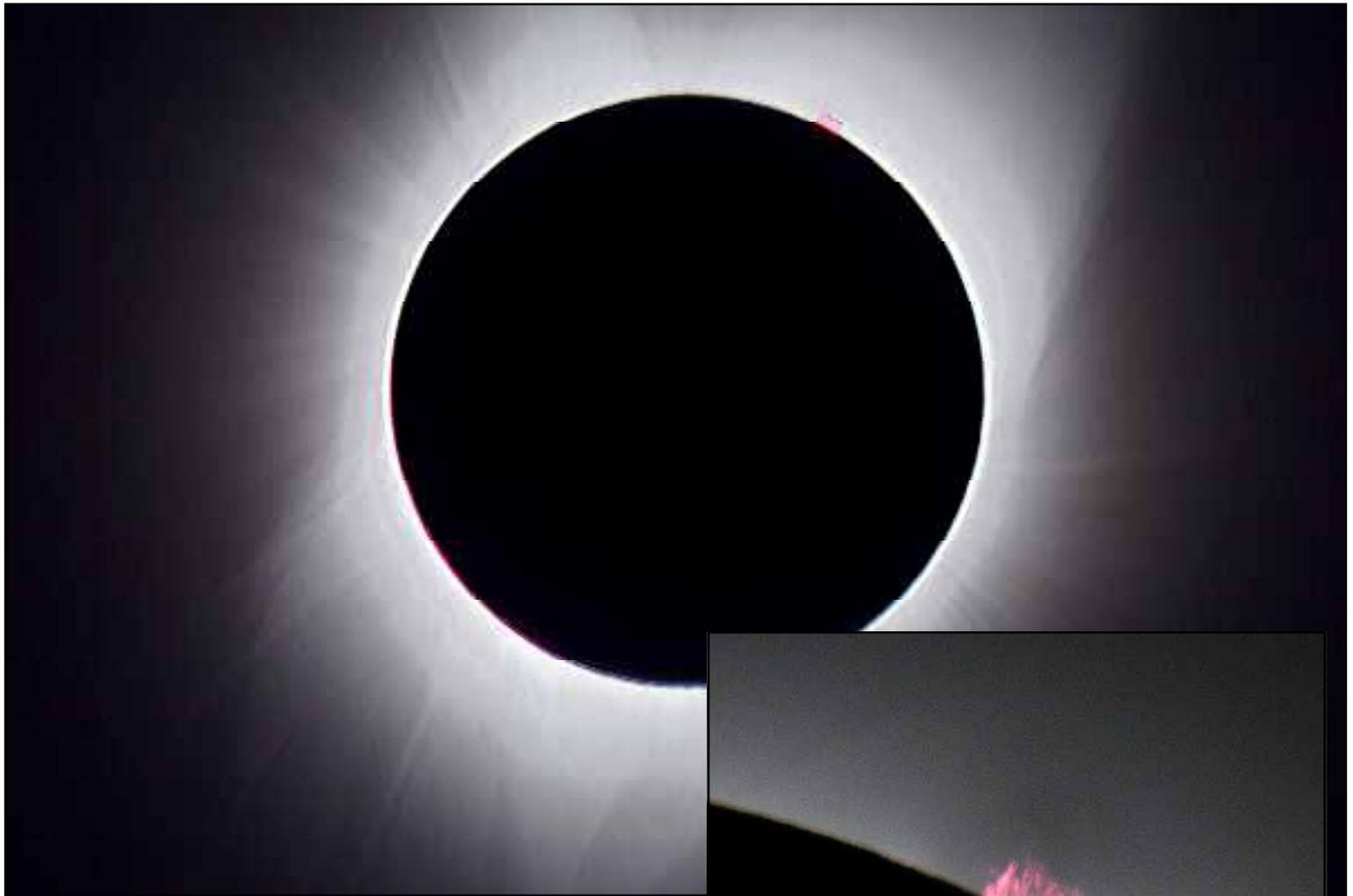
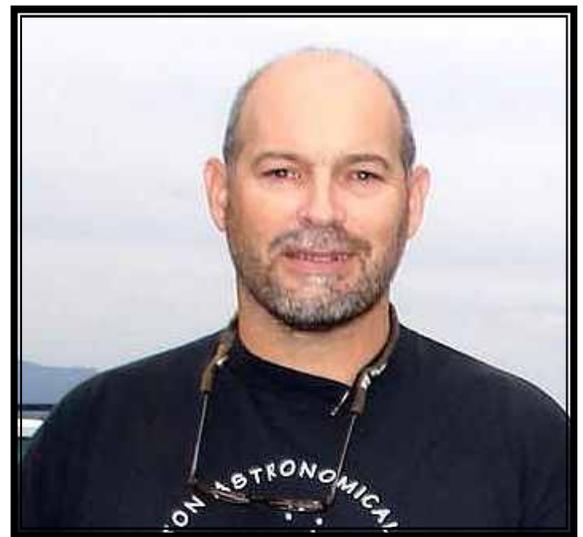
Both the school principal and our contact person, Melanie Miner, expressed their appreciation for us coming to their event with our telescopes.

Wayne Lord



Jeff and Glenda Baldwin of the Stockton Astronomical Society (SAS), took these stunning eclipse photos between Long Creek Oregon and Fox Oregon (1/4 to 1/2 mile west of US 395). They used an Astrophysics 140 EDF Starfire refractor, Takahashi EM400 mount, and a Canon EOS2i DSLR. They shot exposures at ISO 200 and bracketed between 1/1250 second and 1/3 sec. The above is definitely a Wow Photo! Observer Editor

# More Photos from Jeff Baldwin



# Solar Eclipse

by Ross Gorman



Grand Teton, Woming  
August 21, 2017

## Eclipse Observations from Teton Totality

We have all heard about various changes to our immediate surroundings caused by a total solar eclipse. I for one have personally experienced these changes at the two previous total eclipses that I have witnessed. Besides the obvious changes in lighting, I saw birds go to roost on top of Moai during totality of the 2010 Easter Island Eclipse. I also saw shadow bands vibrate across the white surfaces of the cruise ship Millennium during the South Pacific Eclipse of 2012. And on both occasions, I felt the drop in temperature due to the Sun's energy being blocked by the Moon, and I saw that the shadows cast by terrestrial objects increase in sharpness.

For my most recent eclipse expedition, I thought I would try and record these various phenomena with the help of friends and by using various observation methods. Our chosen eclipse observing site was in Lupine Meadows at the eastern base of Teewinot Mountain, which is one of the peaks of the Teton Range in Grand Teton NP (lat: +43.74, long: -110.74). On the morning of the eclipse, we were met with cloudy skies, a Sun halo, and then a couple of Sun dogs. There were even orographic clouds forming above us; coming off of the Teton Peaks. We waited for sunrise to see if conditions would improve. And they did.

So my friends, Tom and Greg, and I setup various "optical instruments" to capture the eclipse visually. These included a:

"Sun Funnel" which optically projects the image of the Sun onto projection screen material,

Pinhole projection placard to project crescent Sun's in a custom pattern,

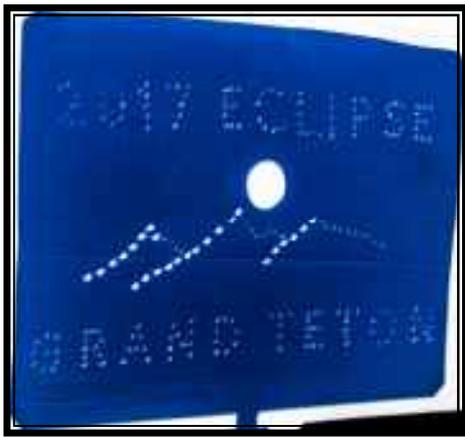
White-light solar filter mounted on an opaque panel for straight through camera imaging of the Sun,

SolarMax 40mm H-alpha telescope to see the eclipse in the Ha wave length, and

90mm Maksutov-Cassegrain telescoped with a full aperture white-light solar filter.



In addition to these optical instruments, we also setup various



“experiments” to capture phenomena we hoped to experience.

## **Shadows**

For shadow bands, we stretched a white sheet over the top of sage brush and mounted a cell phone in video mode on the tripod holding the opaque panel. You can see the results of this experiment on YouTube at:

<https://www.youtube.com/watch?edit=vd&v=rcDJMmsZwxg>

Note the change in direction of the shadow bands before, versus after totality. Also note the difference in activity and contrast before, versus after totality.

For shadow sharpness, my friend Tom took pictures of my arm hair as we neared C2. Even from a distance, individual arm hairs were distinct, as opposed to the fuzzy images before C1. This is because, as the Moon encroaches onto the Sun, the Sun's light is narrowed to nearly a pin-point source. Thus the overlapping effects of shadows from different sides of a larger light source are mitigated. You might say it is all umbra, with little penumbra.

My other friend, Greg, also conducted an experiment to demonstrate that different sides of a tall object's shadow, cast during an eclipse, will have



different sharpness. Greg simply stood a thermos on a table and took pictures of the shadow as the eclipse progressed. North is to the top of the image. You can clearly see that the shadow is sharper below than above the watch – even at about 20 minutes after totality. This is another example of the light source’s size determining sharpness.

What’s interesting in this experiment is: Which side of the crescent Sun is producing which side of the shadow does matter. And that this effect is evident long before and after totality.



### Animal Behavior

During totality, my friend Greg also recorded birds going to roost. In our case, it was a pair of Ravens that huddled together on a tree branch not far from our observing site. One Raven has both eyes closed, while the other keeps one wary eye open to keep watch on Greg.

In addition, we all heard Sandhill Cranes out in the meadow call to one another during totality. They were calling like this as the Sun rose that morning while we were setting up our observing site – this is captured at the end of my YouTube

video. But we didn’t hear them during the hours approaching totality, nor after totality. Only at that day’s sunrise and the “sunset” of totality did we hear multiple Cranes calling to one another at one time.

### Atmospheric Conditions

The last experiment that we conducted during the eclipse was to record the change in atmospheric conditions (air temperature and relative humidity). This data was collected from a household, outdoor, digital thermometer that also shows relative humidity. The instrument was placed in the shade of the opaque panel, and photographs of its readings at various critical times of the eclipse were taken. A graph showing that data against the contact times of the eclipse is presented below.

### Air Temperature

As the Sun was slowly covered by the Moon starting with C1, the ambient air temperature slowly dropped. Specifically, the initial decline in air temperature was from a C1 reading of nearly 72° F, to a 65° F reading ten minutes prior to C2. That’s a 7° F drop over a time lapse of 68 minutes. For a rate of change of -1° F/10 min. Then the temperature accelerated its decline and dropped another 10° F in just 23 minutes; continuing a fairly constant rate of decline of just under -5° F/10 min during the *T-10 minute* and the *T+10 minute* periods that straddled totality. This rate of decline is nearly 5 times faster than during the initial decline that occurred during the 68 minute period after C1.

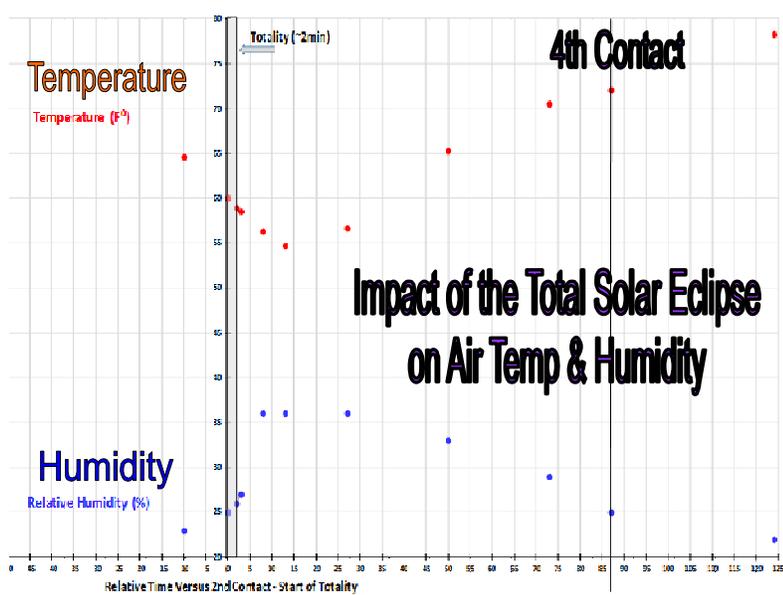
*I can tell you, anecdotally, that during the T-10 minute period before totality, the temperature change was such that my exposed arms became chilled and I felt the breeze pickup. So much so that my skin produced goose bumps.*

Note that the temperature continues to drop even after the end of totality. In fact, the Sun

was unable to turn the tide and warm the air until 11 minutes after totality's end. This results in a minimum recorded air temperature of about 55° F, or 17° F below the start temperature. Once outside of the -/+10 minute time periods that bookend totality, the Sun was sufficiently exposed that it could gradually raise the air temperature. But it took 37 minutes to recover the first 10° F, from 55° F to 65° F. And then another 37 minutes to recover another 7° F to 72° F.

For a total time lapse for full 17° F re-cover of about 74 minutes. The rate of change during this recovery period was +2.3° F/10min.

It can be surmised that the more than twice as fast temperature recovery rate during the C3 Phase versus the initial temperature decline during the C1 Phase has a lot to do with the Sun gaining altitude during the C1 and C3 Phases. As a matter of fact, the Sun reached its maximum altitude for the day during the C3 Phase. A rising Sun will slow the rate of decline in temperature during pre-totally, but also act to speed up its recovery post-totally.



### Relative Humidity

As for relative humidity (RH), it remained unchanged during the initial temperature decline of the C1 Phase at about 22%. But then responded dramatically by rising when air temperature accelerated its decline during the 10 minutes pre- and post-totally. This was expected – as air temperature falls precipitously, the water content contained in the air would remain the same, thus humidity in relative terms would rise. However, while air temperature was still declining post-totally, RH reached a point of stability only 6 minutes after totality had ended. This stable level was also its maximum reading at 36%. There it stayed until temperature had recovered to the 65° F value, at about 48 minutes after totality. From there, air temperature fully recovered to its C1 level of 72° F by the time of C4. While RH only dropped back down to its C2 value of 25% at C4's time. It would take another 37 minutes, and an added temperature rise of 6° F, before RH would fully recover to its pre-eclipse start level of 22%.

### Summary

All in all, it was a successful eclipse expedition. We were able to see totality under clear skies while in the company of the Teton Peaks, which was our first priority. We were also able to accomplish all of our eclipse experiment goals - to record the eclipse phenomena that we had hoped would occur, which was our secondary priority. And we took some amazing eclipse photos to boot.

This was all accomplished during the shortest totality that I have personally experienced (only 2 min. 15 seconds), and with cloud filled skies just hours before totality (see end of YouTube video for cloud conditions). I feel very fortunate for the success, and for being

# Total Solar Eclipse Weiser, Idaho

by Ralph Merletti

My 4-state trip to the path of the total solar eclipse included I-80 from Sacramento to Winnemucca, NV., and northward on US 95 towards the Weiser, ID. destination. I stopped in Jordan Valley, OR. to attend Sunday morning Mass in this Basque community at St. Bernard's Catholic Church (on the feast day of this saint), and I enjoyed a luncheon get-together in the parish hall afterward. Then back on the road northward through the beautiful farmland towns of the Snake River Plain. Along the way there was an "Eclipse across Idaho" billboard sign urging everyone to check fire regulations, warning against parking on dry grass, and picturing an RV with a campfire in a rural area. Driving into Weiser, ID., I found none of the heavy traffic jams and huge crowds that I had previously heard about in central Oregon! Most of the people were at specifically-designated observation sites, especially in the large Memorial Park with many "county fair"-type booths, and some concert entertainment in an adjoining sports field area. I had time to explore the town and possible observation sites, as thickening cirrus clouds dimmed the sun. It wasn't until early the next morning that I finally located an open non-reserved parking site that I found to my liking, adjacent to Memorial Park.

Monday, August 21, 2017 dawned mostly clear; the partial eclipse phases built anticipation, the sky and landscape darkened, Venus became visible, a few park lights popped on, and the crowd excitement became quite audible. I had a great view of the total eclipse, visually and telescopically, from my location (approx. 2,200' elev. above sea level) on an elevated parking field next to, and overlooking Memorial Park in Weiser, Idaho--(some 70 miles NW



of Boise, across the Snake River from Oregon). My pictures of totality are not great, but my main goal was to see it at 10x in my finder scope, and especially totality at 25x in the main tube of my 3" refractor. I got what I wanted--nice close-up views of the beautiful pink/magenta-colored prominences, three groups of them, an arc of the pink chromosphere on the same trailing limb during my 2nd viewing, and delicate lines of force in the corona. All too soon it was time to quit viewing without a filter, as the sun's surface was about to reappear. Before and after totality, numerous pictures of me with the partial eclipse image projected through my tele-





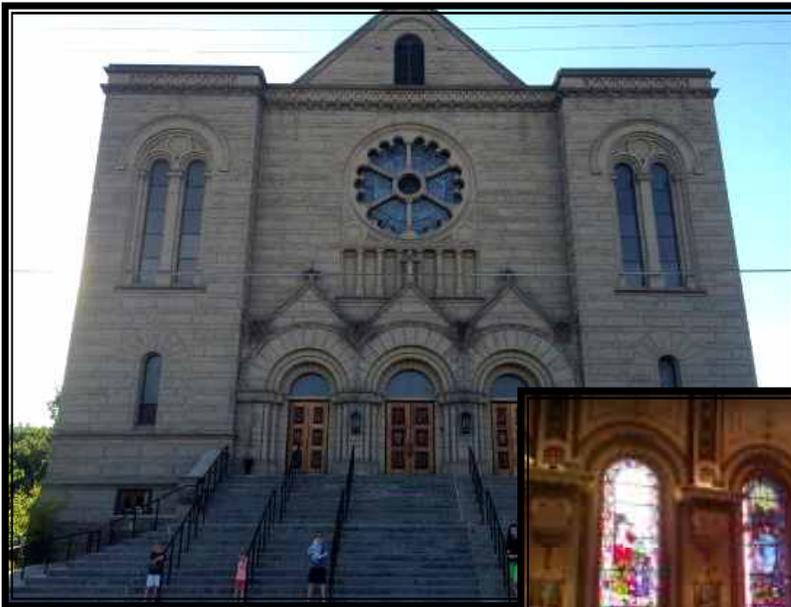
scope's main tube were taken. I placed signs in English and Spanish, at the foot of my tripod, warning DANGER! NO FILTER! DO NOT LOOK INTO! Unique pictures of my earth globe with my binocular-projected image of the approximately 50% returning partial eclipse on it were taken, as well as a few eclipse crescents from a tree shadow at a residence nearby. This being my 5th total eclipse, "high-fives" were in order! I



met people from Canada, Spain, Marysville, CA., and Roseville, CA. I left the observation site in Weiser later in the afternoon, and after visiting some of the remaining booths I purchased an eclipse t-shirt (showing a very thin inner corona and returning diamond ring on the limb just where I saw it for real!). I collected a lot of brochures, and a local community newspaper/guides/maps that included information on local/regional eclipse activities in the Oregon/Idaho border area.

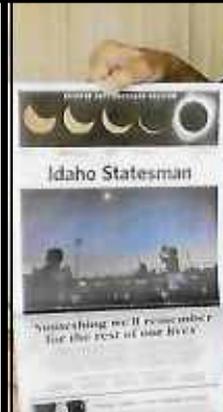
I then drove to Boise, arriving downtown at the State Capitol shortly before 7pm. The Capitol was closing, so I took pictures from outside, including more distant views including mountains, as well as outside of the nearby St. John the Evangelist (Catholic) Cathedral. I made plans to visit both of these the next morning. The local newspaper would arrive around 4am. I was surprised and happy to see a now-familiar scene on the front page of the August 22, 2017 edition of the IDAHO STATESMAN-- a wide-angle view of the total eclipse high in the sky, with beautiful twilight colors silhouetted by three observers in the foreground. In the background were the dark stadium light poles at Weiser's Memorial Park, indicating it was taken only footsteps from where I observed the total eclipse!





I spent the following day in Boise which included Mass in the basement chapel at St. John's Cathedral, a visit to the State Capitol and the Office of the Governor, and the Boise State University football stadium with its unique blue turf field where the Broncos practice and play their home games. Then on to the printing offices of the Idaho Statesman, where I bought 15 souvenir copies of the newspaper featuring the front page Weiser scene, more Weiser coverage inside and elsewhere in Idaho and the nation, of the Great American Eclipse.

Ralph Merletti



# Twenty Years Ago on Mars...

by Linda Hermans-Killiam



On July 4, 1997, NASA's Mars Pathfinder landed on the surface of Mars. It landed in an ancient flood plain that is now dry and covered with rocks. Pathfinder's mission was to study the Martian climate, atmosphere and geology. At the same time, the mission was also testing lots of new technologies.

For example, the Pathfinder mission tried a brand-new way of landing on Mars. After speeding into the Martian atmosphere, Pathfinder used a parachute to slow down and drift toward the surface of the Red Planet. Before landing, Pathfinder inflated huge airbags around itself. The spacecraft released its parachute and dropped to the ground, bouncing on its airbags about 15 times. After Pathfinder came to a stop, the airbags deflated.

Before Pathfinder, spacecraft had to use lots of fuel to slow down for a safe landing on another planet. Pathfinder's airbags allowed engineers to use and store less fuel for the landing. This made the mission less expensive. After seeing the successful Pathfinder landing, future missions used this airbag technique, too!

Pathfinder had two parts: a lander that stayed in one place, and a wheeled rover that could move around. The Pathfinder lander had special instruments to study Martian weather. These instruments measured air temperature, pressure and winds. The measurements helped us better understand the climate of Mars.

The lander also had a camera for taking images of the Martian landscape. The lander sent back more than 16,000 pictures of Mars. Its last signal was sent to Earth on Sept. 27, 1997. The Pathfinder lander was renamed the Carl Sagan Memorial Station. Carl Sagan was a well-known astronomer and science educator.

Pathfinder also carried the very first rover to Mars. This remotely-controlled rover was about the size of a microwave oven and was called Sojourner. It was named to honor Sojourner Truth, who fought for African-American and women's rights. Two days after Pathfinder landed, Sojourner rolled onto the surface of Mars. Sojourner gathered data on Martian rocks and soil. The rover also carried cameras. In the three months that Sojourner operated on Mars, the rover took more than 550 photos!

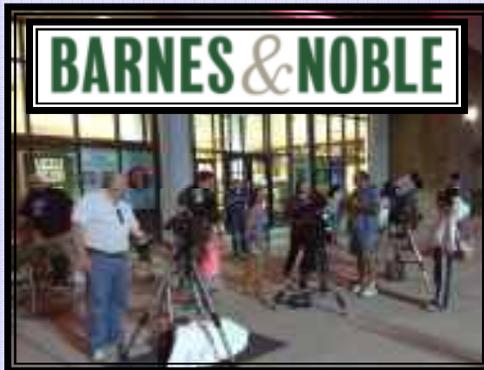
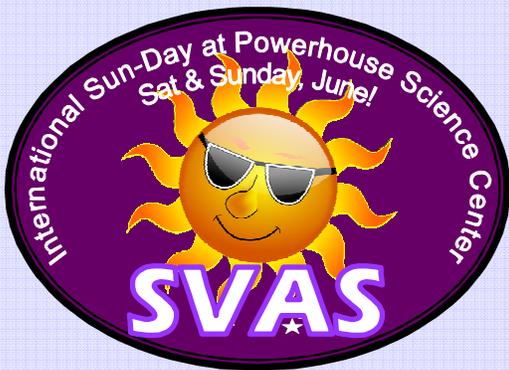
Pathfinder helped us learn how to better design missions to Mars. It gave us valuable new information on the Martian climate and surface. Together, these things helped lay the groundwork for future missions to Mars.

Learn more about the Sojourner rover at the NASA Space Place: <https://spaceplace.nasa.gov/mars-sojourner>

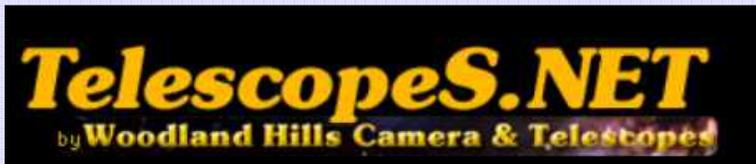


*The Mars Pathfinder lander took this photo of its small rover, called Sojourner. Here, Sojourner is investigating a rock on Mars.  
Image credit: NASA/JPL-Caltech*

# SVAS Main Events & Sponsors



## SVAS Sponsors!



# Classifieds

## Large Aperture Aluminum Telescopes with SlipStream GoTo Drive System

These all metal telescopes offer extreme durability, precision of movement, ease of use and a pleasing low profile aerospace look. They feature:

- \* Highest quality optics
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- \* Argo Navis DSC's
- \* SlipStream Drive with slip clutches on both axes
- \* Rigid welded structure
- \* Durable powder coating and black anodizing
- \* Available in sizes from 16" to 40" and f/ratios from f2.8 to f4.



This is a complete telescope system. It will automatically GoTo and then track any object you bring up on the Argo Navis. Or you can move the scope by hand at any time with no clutches to engage or disengage. A wireless hand control also gives you a 3-speed slew for both axes, allowing you to center objects or do fine guiding. Check our website for pricing and details.

### EQUATORIAL PLATFORMS

15736 McQuiston Lane Grass Valley, CA 95945  
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# SVAS Officers

President *Walt Heiges* Vice President *Lonnie Robinson*

Secretary *Kevin Heider* Treasurer *Kevin Normington* Past President *Ross Gorman*

## SVAS Board of Directors

~ Even Year Term ~

~ Odd Year Term ~

*Tom Braun* *Fera Zamani* *Chuck Real* *Charles Jones*  
*Gary Shuluk* *Raj Dixit* *David Macho*

**\*\*Please visit SVAS.Org for contact Information\*\***

## Committees

Membership / New Members	Walt Heiges / Kevin Normington
Star-B-Q & Resources	Walt Heiges
Yosemite Star Party	Tom Braun
Newsletter Editors	Lonnie Robinson / Walt Heiges
Speaker Seeker	Fera Zamani
SVAS Web Site	Gary Shuluk / Walt Heiges
Public Outreach Director	Walt Heiges
Community Star Parties	Wayne Lord
Observatory Director	Stuart Schulz
Help for Beginners	Lonnie Robinson
Amateur Telescope Making	Lonnie Robinson / Bill Thomas
Scholarships	Chuck Real / Kevin Normington

## Where We Meet

**General Meetings** The third Friday of each month beginning at 8:00pm.  
**Board Meetings** 6:30pm on the same day. All members are welcome.  
**Star Parties** On weekends nearest the new Moon.

Arcade  
 Sacramento Public Library  
 2443 Marconi Ave.  
 Sacramento, CA. 95821  
**WWW.SVAS.ORG**

## SVAS Observer - Newsletter

**To Subscribe-** First send in your membership application form below, with your dues, and upon approval by the Board of Directors the Observer newsletter (published bi-monthly beginning January) will be sent to your supplied email address in .pdf format. Second, request to join the SVAS Yahoo Group at <http://groups.yahoo.com/group/svas-members>. This group will keep you informed with the day to day current events and discussions.

**Articles-** Manuscripts and letters are welcome in MS Word, MS Publisher, or plain text format, and emailed to the SVAS Editor. Submission deadline is the 15th of the newsletter release month.

**Advertising-** Commercial, non-personal advertising, business card, and full page are available. Classified advertising is free to SVAS members.

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# Membership Applications

# Contact Information

# Please Visit SVAS.Org >Join

### Observatory Membership

Observatory Membership offers the benefits of a regular membership plus unsupervised access to Henry Grieb Observatory (HGO), and Robert J. Mathews Observatory (RJMO). **To apply, you must have been a general member for six months or longer, be trained and approved by the Observatory Director, send in your application with the additional dues, and then be approved by the SVAS Board of Directors.**



### Please allow 30 Days Or More for Application Approval

By signing your application, you acknowledge that you have accessed the SVAS website [SVAS.org](http://SVAS.org), read and understand the SVAS bylaws and the rules governing the USFS Special Use Permit. In doing so, agree to abide by the respective "terms and conditions" of each as they relate to using the SVAS property and facilities. I further understand and acknowledge that failure to abide by these "terms and conditions" can result in revocation of use privileges and/or your SVAS membership.