FOCUS

The Newsletter of United Astronomy Clubs of New Jersey, Inc.

Editor: Diane Jeffer info@uacnj.org www.uacnj.org www.facebook.com/UACNJ September 2017

Special Eclipse Issue

In addition to the UACNJ Observers who hosted over 1000 eclipse watchers at our Jenny Jump State Forest facility, many of our volunteers traveled far and wide to view the eclipse on August 21. In this special issue of *Focus*, we will share their stories and photos.

Our Member Clubs

See page 21 for a complete list of our Member Clubs

Here's an overview of eclipse events hosted by some of our Member Clubs. Read more about these events on pages 5-6.

AAA hosted viewing at Pioneer Works in Brooklyn and at Bethesda Fountain in Central Park, drawing hundreds at each site. **AAI** shared solar telescopes with the public at Union County's Trailside Nature and Science Center. **AAAP** hosted an event at their observatory in Washington Crossing State Park. **LVAAS** held a "Friends and Family" event for their members which was attended by over 100 people. **MMAS** helped over 600 people safely view the eclipse at the Morris Museum in Morristown. **NJAG** hosted an event at the Haworth Public Library. **SHAA** opened their observatory and also helped out at the Holmes Public Library in Boonton during the eclipse.

Upcoming Programs and Speakers

Our weekly Saturday evening programs begin at 8:00 PM and include a 45-60 minute presentation followed by observing on UACNJ equipment until 10:30 PM when the weather cooperates.

Date	Topic	Speaker
9/23	Lunar Observation: Fact, Fiction, Falsehood	Gary DeLeo, Lehigh U
9/30	Grand Finale at Saturn	Krishnadas Kootale, MMAS
10/7	What's up in the October Sky?	Lonny Buinis, RVCC
10/14	History of the Galaxy	Jason Kendall, WPU
10/21	Northern Lights	Gregg Waldron, NWJAA
10/28	What's Up in the Winter Sky?	Lonny Buinis, RVCC

Thank You

Donations to UACNJ are tax deductible! You may donate when you visit or on our website at any time.

Viewing the Eclipse at Jenny Jump

Despite posting an opening time of 12:30 PM, people began arriving outside the UACNJ gate before 10 AM. State Park Police encouraged us to open the gate (although the house was kept locked) to avoid a traffic jam at the observatory entrance.

Ted Frimet coordinated parking for the event. By the end of the day, 264 cars had made it up our driveway and we had managed to park nearly 100 cars on observatory property. Another 150-200 cars were parked on the access road, along State Park Road, and in the State Forest overflow lot. Park Police estimated that over 1000 people attended our event with over 600 on-site during the 72% peak of the partial eclipse.

With so many of our regular volunteers in the path of totality, we had only 11 volunteers onsite for this historic event. Volunteer Chris Callie noted, "I'm still not entirely sure how we pulled off an event of this magnitude with no issues, but I'm very glad we did!" UACNJ President Matt Heiss wistfully stated, "We had a record breaking turnout with people of all ages coming together for the love of science."

UACNJ owns four pairs of solar binoculars which were freely passed around. The UACNJ-owned Lunt hydrogen-alpha solar telescope and Astro-Physics telescope fitted with a solar filter, both in our Brady Observatory, and several other white-light telescopes operated by our volunteers, were accessible to the public throughout the event. In addition to over 120 pairs of solar glasses that were sold on eclipse day (and hundreds more sold in the preceding weeks), our volunteers had a dozen pairs of solar glasses that visitors used and shared during the eclipse.

Inside the main building, the path of totality was live-streamed throughout the afternoon. Our gift shop was a hive of activity with Observer Kim Trumpore greeting hundreds of visitors who stopped in to purchase solar glasses, bottled water, astronaut ice cream, and other items.

Some of our guests on eclipse day brought their own home-made solar viewers, at least one family sported eclipse-themed shirts, and everyone brought an eagerness to learn. Volunteer Marcus Valdez observed that "We had a lot of fun; a lot of really nice people."

When it was all over, Ted Frimet (master of parking!), observed, "I wanted to take the time, and the opportunity, to let all of you know just how important your contributions are, in being present in the moment at remote sites and pursuing your passion, and in establishing the momentum of amateur astronomy, now and forever. I am proud to be a member of UACNJ."

Thanks to our Onsite Volunteers!

Karen Brady	Marci Halevi	Kim Trumpore
Chris Callie	Matt Heiss	Emily Trumpore
Paul Fischer	Gil Jeffer	and
Ted Frimet	Greg Takesh	Marcus Valdez

Viewing the Eclipse at Jenny Jump

Eclipse day scenes at Jenny Jump

Eclipse composite on page 1 by Chris Callie.
Photo on page 2 by Chris Callie.
Photos on pages 3-4 by Gil Jeffer.

Viewing the Eclipse at Jenny Jump

Club Events

AAA at Pioneer Works
Photos below by Faissal Halim

AAA at Bethesda Fountain in Central Park
Photos at right by Marcelo Cabrera

Club Events

AAI at Trailside Nature and Science Center
Photo by Tolga Gumusayak

NJAG at Haworth Public Library
Photo by Mark Zdziarski

Members of North Jersey Astronomical Group shared three filtered telescopes, a Sunspotter, and a pair of binoculars with solar filters with 150-200 people.

MMAS at Morris Museum
Photo by Ron Russo

MMAS got some great pre-eclipse publicity: http://www.dailyrecord.com/story/news/local/2017/08/09/eclipse-hits-nj-weird-things-likely-happen/104411006/

UACNJ Observers Were Everywhere!


Photo by Diane Jeffer

In addition to all the activity at our facility in Jenny Jump State Forest and at our Member Clubs, many of our volunteers traveled to the path of totality to view and photograph the eclipse. Read more about their adventures on pages 9-16.

Madras, Oregon—Gregg Waldron
Madras, Oregon—Stan Honda
Driggs, Idaho—Kevin Conod
Glendo, Wyoming—Sean, Collette, and Sebastien Post
Shohoni, Wyoming—Alex Varakin
Grand Island, Nebraska—Tony Hoffman
Gilbertsville, Kentucky—Nathaniel Frissell
Alcoa, Tennessee—Earl Pursell
Clarksville, Tennessee—Steve Lowe, Aaron Zuckerman
Portland, Tennessee—Lisa Lohse
Spring City, Tennessee—Bojidar Marinov
Brevard, North Carolina—Michael Lamonaco
Marble, North Carolina—Rich Mailhot, Emily Mailhot, and Alan Midkiff

Still other UACNJ volunteers viewed the partial eclipse from a variety of locations across the country:
Big Pine, California—Dale Gary
Brackney, Pennsylvania—Diane Jeffer
Belvidere, New Jersey—Karl Hricko
Teterboro, New Jersey—Jeff Williams
Union, New Jersey—Helder and Elizabeth Jacinto
New York City, New York—Tony Sharfman

Other Ways Our Members Experienced the Eclipse

UACNJ Observer Dale Gary, AAI and NJIT, is the director of the Expanded Owens Valley Solar Array in California. He provided this video of a single frequency of the array's radio signals during the eclipse: www.youtube.com/watch?v=868ddcUdhD0&sns=em. Dale notes that you will see the radio-bright sunspots covered in succession, then they all reappear again. The Solar Array actually observes more than 100 frequencies, and Dale plans to make much higher quality images in the coming months.

Nathaniel Frissell (right), NJIT, led a team that hosted a ham radio QSO party during the eclipse with a goal of gathering contacts from around the world broadcasting at different frequencies. They observed during totality that communication contacts at the higher frequencies decreased while those at lower frequencies increased. This suggests a decrease in both the maximum usable frequency and absorption in the D-layer of the ionosphere during the eclipse. hamsci.org/article/first-hamsci-eclipse-results-tapr-arrl-dcc

More Eclipse News, Views, and Videos

Eclipse views from the International Space Station (ISS), Solar Dynamics Observatory (SDO), and more: https://www.nasa.gov/content/solar-eclipse-from-the-international-space-station

ISS transit during the eclipse: https://www.nasa.gov/image-feature/iss-transit-during-a-partial-solar-eclipse-2017

Stan Honda (AAA) on CBS This Morning: https://www.cbsnews.com/videos/tips-on-solar-eclipse-photography-from-stan-honda/

Eclipse Megamovie: https://eclipsemega.movie/

Montana State University Eclipse Ballooning Project: http://eclipse.montana.edu/

Safe Viewing


Photo by Marcelo Cabrera

◄ A home-made pinhole viewer

▼ Solar glasses


Photo by Diane Jeffer

Mary Lou West's Sunspotter was a big hit at the NJAG event at the Haworth Public Library. By using a series of mirrors, the device projects a solar image onto a viewing screen through a powerful 62mm diameter objective lens.
photo by Mark Zdziarski

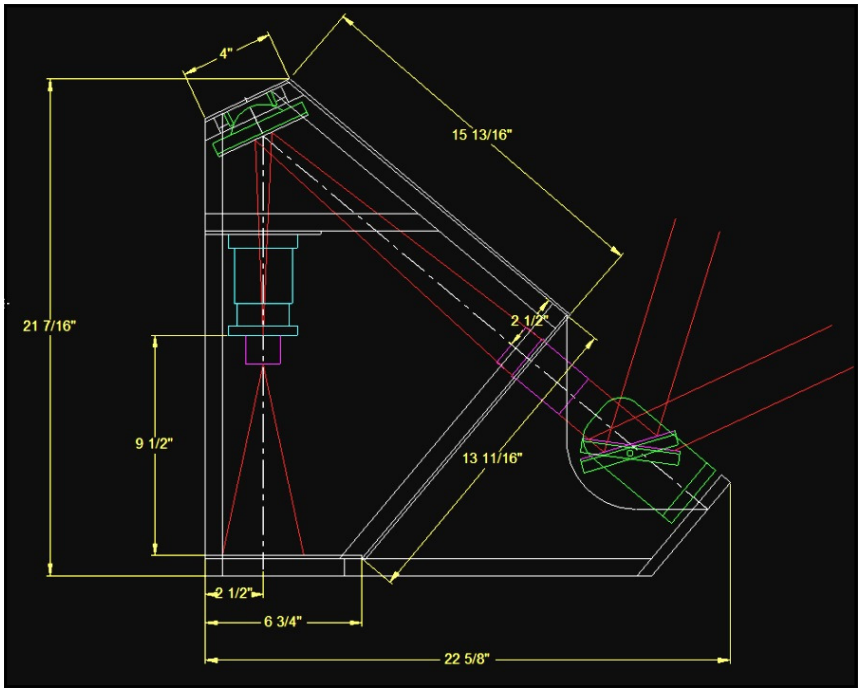



Photo by Bill Eberly

◄ Allen Malsbury built this folded refracting telescope which was used at the MMAS event in Morristown. It has an internal mirror that "folds" the light. The folded light then passes through a 1¼" standard eyepiece and is projected onto a piece of ► paper. To make it more user friendly, Allen added a second mirror in front of the folded telescope. This mirror pivots on a bearing at an angle set for our latitude, roughly 40 degrees, allowing the operator to manually track the sun without having to move the whole unit. See Allen's color plan above.


Photo by Bill Eberly

Reports from our Observers

Michael LaMonaco, NJIT and AAI

My family rented a home in Brevard, North Carolina that was just inside the path of totality. This was my first eclipse so I didn't know what to expect.

The eclipse began at 1:08 PM; we spent the next hour and a half eagerly waiting for totality. No amount of research prepared me for what we were about to see. At about 2:20, just 16 minutes from totality we began to notice significant cloud cover. Did we travel over 700 miles to miss the pinnacle of the eclipse at the last moment? We continued viewing through a thin hazy cloud and at about 95 percent coverage the clouds began to break. It was quite dark now; birds were singing night songs as if it was dusk and insects began chirping as well.

I was using a remote trigger to take photos when suddenly, a much more defined shadow came rolling over us as the temperature dropped. It was as if the lights went out and immediately as they did what looked like a black hole in the sky ignited. The corona looked like a hot white flame erupting around the moon. We couldn't help but shout and cheer, it was as if a primal instinct took over. The neighbors could be heard doing the same, and there were car horns honking and faint cheers coming from the center of town.

I couldn't look away, it grabbed hold of me and demanded I stay fixed in its gaze. We had only about one and a half minutes of totality; I must have stayed fixated for a good 30 seconds. I shook it off, ripped the solar filter off my scope and went to work, snapping about 10 photos at various exposure times. I had another 15 seconds to soak it in with my own eyes and then, just like that, it was over.

The sunlight came barreling back with a vengeance and we felt the temperature rise almost immediately. Before I could even attempt any more photos, the clouds took over. A local weather channel explained that the change in temperature during totality reduced the humidity and allowed the clouds to break just in time; when the shadow left us, the clouds reformed.

The sight of the eclipse was something I will never forget. It's so incredibly hard to describe how horrifying yet beautiful it was to witness. Something so permanent as the Sun, vanishing before our eyes; it's no wonder ancient peoples thought it was the end of the world when eclipses occurred. I know for sure that the bug has bitten; I will be chasing those few minutes of totality any chance I get for the rest of my life.

Photos in Brevard, North Carolina by Michael Lamonaco.

Reports from our Observers

Photo by Gregg Waldron

Gregg Waldron, NWJAA

My wife and I stayed in Mitchell, Oregon and drove about an hour to Madras where we had staked out a spot in a farmer's field a few days before the eclipse Despite the crowds in the numerous tent cities that had sprung up in the area, only one other pair of tourists joined us at our spot.

We had two small telescopes—a white light solar scope and a hydrogen alpha scope—plus lots of eclipse glasses, and a pair of solar filtered binoculars. The other couple rigged up a solar projection system using two white cards of poster board and a monocular bored through the center of one card to project the Sun's image for safe viewing.

The temperature got noticeably cooler about 30 minutes before totality and continued to cool until totality. Cows nearby retreated to their bedding locations as the sky darkened, and birds went quiet. Due to local obstructions, we did not see the moon's approaching shadow on the horizon before totality, but we did get to observe shadow bands on a white towel I had positioned on our rental car.

Local wild fires added a slight haze to the sky that day, but did not impair enjoyment of the eclipse. The two minutes and four seconds of totality passed by very quickly. During totality, we could easily see Venus near the zenith, and a few bright stars. Seeing the constantly familiar Sun undergo such a dramatic transformation was a truly awesome experience.

On the way back to Mitchell, traffic was very congested. Our one hour drive to the farmer's field turned into a five hour trip home. Motorists were patient on the road, but I think the volume of cars was greater than anything the local police had ever experienced. Madras has a population of around 7,000 and is not really a huge tourist destination. The National Guard was onsite to support directing the traffic.

My wife and I are already making plans to see the total solar eclipse in July 2019 in Chile. The town of La Serena is supposed to be a beautiful Pacific coast destination, and is located near the large telescopes in the Atacama desert.

Reports from our Observers

Alan Midkiff, Emily Mailhot, Rich Mailhot, NWJAA

We traveled to the Smokey Mountains to view the eclipse along the centerline from the parking lot the Oak Grove Baptist Church in Marble, North Carolina. Early horizon clouds gave way to clear wide-open skies before, during, and after totality.

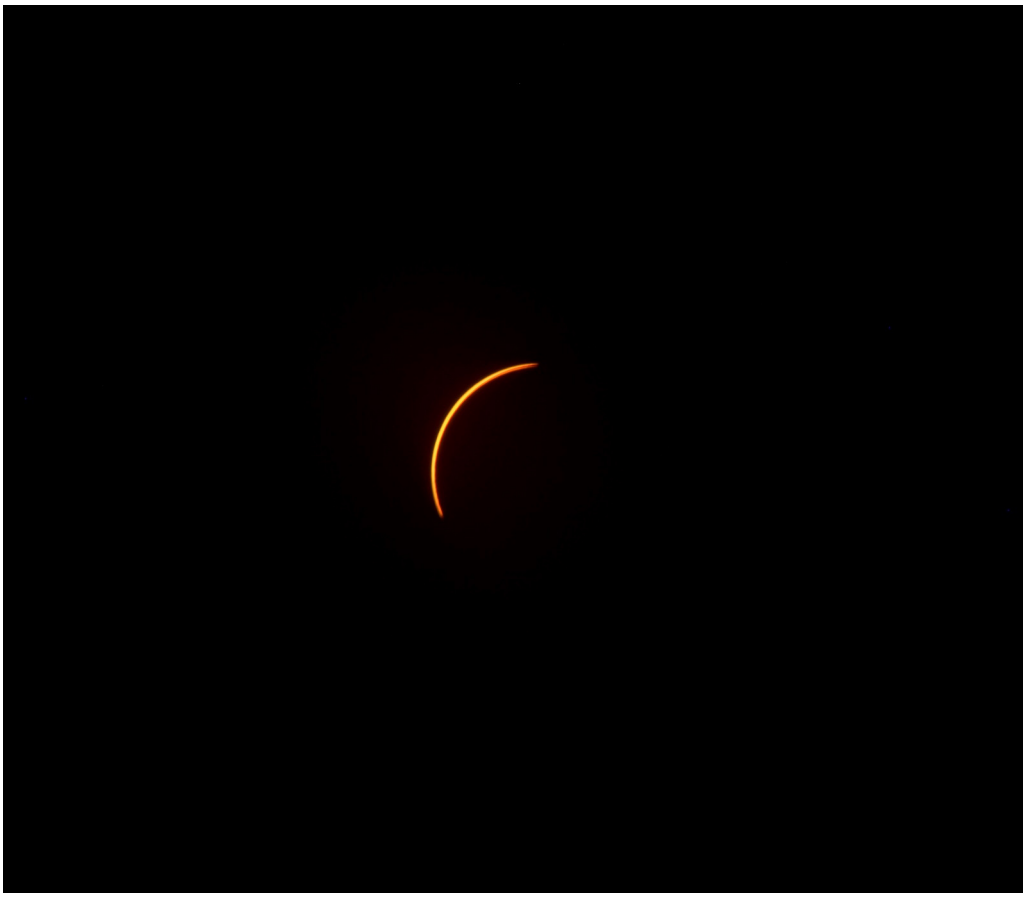
It was truly remarkable to see families from all over—North Carolina, Georgia, Alabama, New Jersey—interacting during the few hours that chance put us in the same place to view the eclipse as if we had known each other forever. It was extra special to be able to teach teenagers and adults about what they were seeing in the telescope. The number of times we heard "oh my gosh!" and "the sun is beautiful" was heart-stopping. Words can't describe what it was really like. The emotions regarding the eclipse itself, paired with the very positive and human experience we had, were priceless.

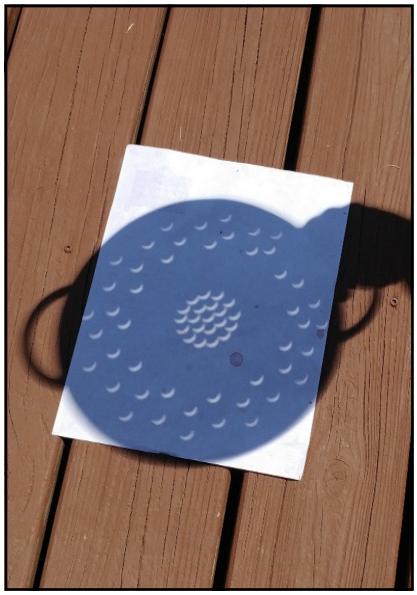
Here's a video of our adventure: https://www.youtube.com/watch?v=GDgIC1W_vJM.

Shadow Bands

▲ Emily took a picture of shadow bands on the ground during totality.
▼ The picture below was taken in Kentucky by Nathaniel Frissell.
You can read about shadow bands here: www.space.com/37776-shadow-bands-are-a-solar-eclipse-mystery.html

Reports from our Observers





▲ The eclipse projected onto a piece of paper through a colander.

◄ Almost totality in Alcoa, Tennessee.

Photos by Earl Pursell

Earl Pursell, LVAAS

I went to Tennessee to visit an old elementary school friend who lives just outside the zone of totality in Knoxville. We made plans to travel to Alcoa where my friend knew a science teacher whose home was in the path of totality.

When we arrived, we found they had a large yard with no trees, and a deck with an awning, beer, and a grill with hot dogs and bratwursts for lunch. We set up my gear (telescope and camera fitted with filters and a bunch of eclipse glasses) just as the partial eclipse started.

Since neither telescope nor camera were guided, I checked them every five minutes or so to re-align them and take a photo. We spent the between times under the shade of the awning, drinking beer and chatting. Between the telescope, camera, eclipse glasses, and a software app I had downloaded (Eclipse Timer), everyone got to see all the phases of the partial and full eclipse, including the sunspots early on. We tried the pinhole-viewer-through-a-colander, crossed-fingers, and image-through-tree-leaves tricks during the partial phases, and all worked very well.

I also monitored the temperature which dropped 15 degrees during the event. About ten minutes before totality, the birds got quiet and the crickets and cicadas started chirping. We soon saw Venus in the sky, and it got much darker (about like twilight); sunset-like colors were visible at the horizon. The view of the total eclipse captivated everyone! Just as totality was ending, we saw shadow bands on the lawn.

We took our time watching the rest of the partial eclipse, then packed up and said our good-byes. We decided that although we gave up a minute by not traveling to the center of totality, we turned what might have been a Herculean ordeal into a pleasant and enjoyable afternoon.

Reports from our Observers

Sean, CJ, and Sebastien Post, NWJAA

We went to Glendo, Wyoming, which was dead center in the zone of totality in the eastern part of the state. We camped in Cheyenne, just over 100 miles to the south. Glendo is a town of 205 people and they had been planning for eclipse day for over two years. They were putting people on their grass strip airport and also in the state park, which were adjacent to each other and just off the interstate.

Traffic getting into town was not bad. They started parking people at 4:00 AM. We arrived just before 9:00 AM. There was about a mile backup of cars entering town, but traffic moved along thanks to the volunteers who were directing traffic into the park and airport. We looked back out at the access road leading into the airport once we were inside.

There was already quite a large crowd gathered and the sky was perfectly clear as we drove to our spot at the end of the field.

Continued on next page

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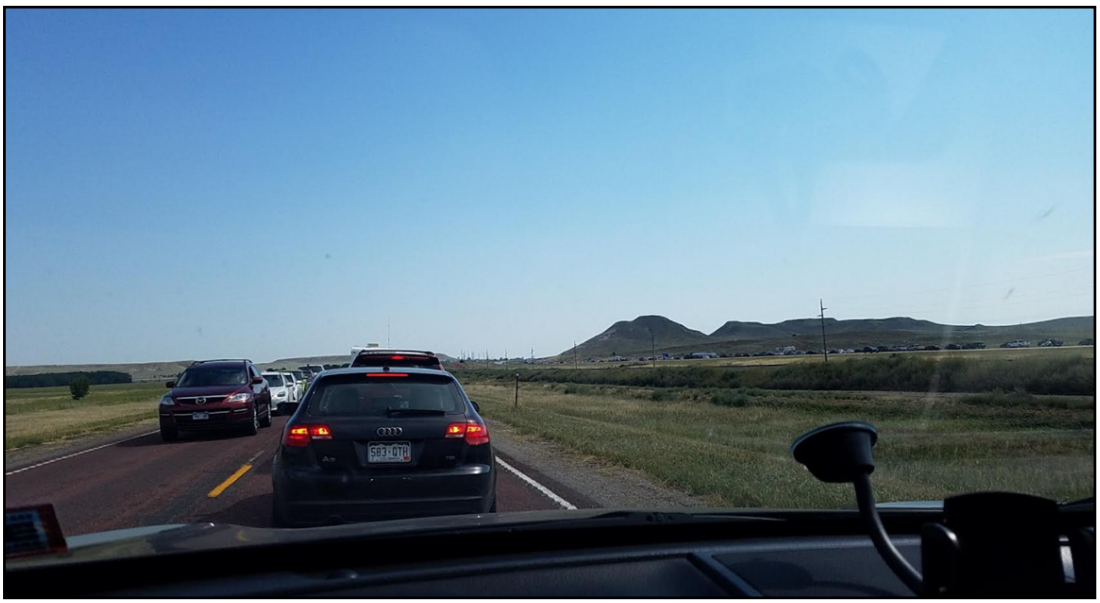
We used a piece of eclipse glasses taped over Sean's phone, and played with the settings a bit to get these photos:






Getting out of Glendo was no easy feat. Their final official estimate was between 130,000 and 150,000 people in attendance. All those cars then had to make their way back to the interstate on the access road, about three miles. It took us six hours to reach the interstate.



The photo above is the view as we headed south out of town on the access road. I-25 is off to the right and was already backed up for several miles. Most of the eclipse watchers came from Colorado—the same direction we were heading—so it took us another four hours from the highway to get back to our campsite in Cheyenne.

When it was all over, six-year-old Sebastien had this to say: "It was something really cool that I'll never forget. I can't wait for the next one." His parents agree!

Reports from our Observers

Kevin Conod, NJAG

I had the privilege of viewing the total solar eclipse on a tour arranged by two retired planetarium friends. We traveled to the little town of Driggs, Idaho located at the eastern end of the Snake River Valley, just to the west of the Grand Tetons and not far from Yellowstone National Park. The long-range forecasts were favorable for the eclipse and our hosts had the foresight to secure rooms in the town's only hotel well ahead of any eclipse fever.

My wife and I met up with our group in Salt Lake City and traveled by bus to Idaho two days before the eclipse. After a fantastic tour of Yellowstone National Park the next day, we eagerly looked forward to the eclipse. The weather forecasts kept showing a bank of clouds sitting over eastern Idaho, but the morning of the eclipse dawned clear and bright with little impact from the wildfires that plagued the western states this summer. All we needed to do was step out of our hotel, walk across the street to the elementary school, and set up our equipment. Quite a convenient spot!

We were joined on the field by a few families from Washington State and Idaho. We all enjoyed views of the Sun as it underwent the partial phases of the eclipse. The sunspots that appeared the week before gave us something interesting to view, talk about, and focus lenses on during the partial phases. Just before totality, the daylight took on a bizarre quality as shadows got sharper. We didn't have any trees right near us but it was fascinating to make a circle with our fingers and project an image of the sun right from our hands.

Then totality came in the blink of an eye; and there was the diamond ring. I made sure to step away from my equipment to observe the twilight all around and to look at the corona and Regulus with binoculars. It got quite dark – but not as dark as night, more like a deep twilight. There were no streetlights nearby but the lights of the convenience store next to the school came on. Venus was easily spotted, and my friend Rick picked out Sirius. I was probably too busy gazing at the "black hole" in the sky!

It was the fastest two and a half minutes of my life. Shortly after totality ended my wife turned to me and asked "I didn't know it was going to be like this! When is the next one?"

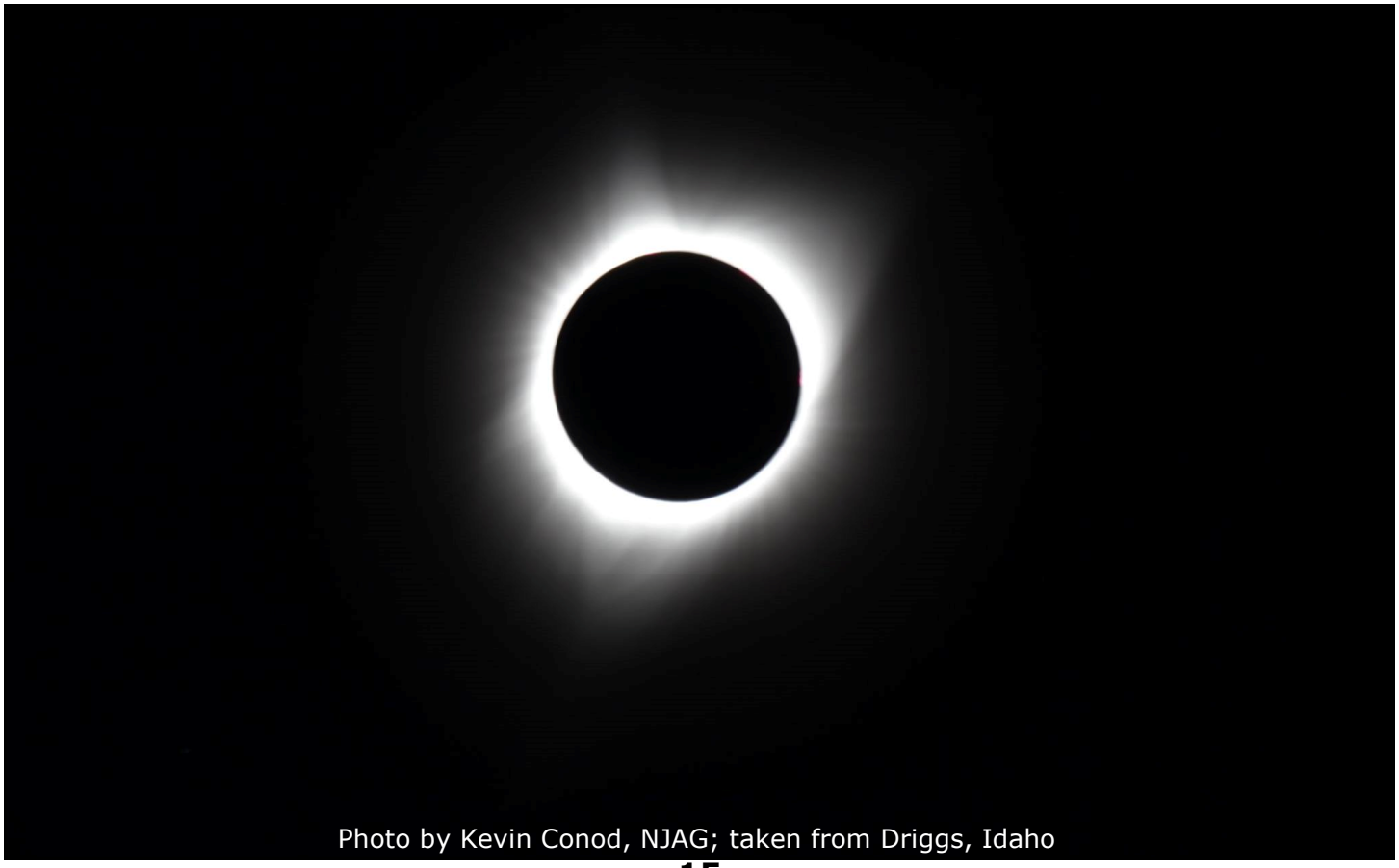


Photo by Kevin Conod, NJAG; taken from Driggs, Idaho

Reports from our Observers


Photo by Warren Westura

Warren Westura, SHAA

It was worth traveling with a kidney stone to see it! That's about the best description I can offer of the Great American Solar Eclipse. I had seen a couple of partials before, but never a total eclipse, so I planned to drive eight hundred fifty miles to Sparta, Tennessee where members of Sheep Hill Astronomical Association (SHAA) had reserved a number of adjacent campsites at Ragland Bottom Campground, only a mile or two off the centerline of the eclipse. This was terrific! Only a minor consideration stood in the way: I had a kidney stone. I figured there were two options: stay home, miss everything, and be miserable or get in the car, be miserable, and see my first total eclipse. Luckily my kidney stone problem resolved itself after my arrival in Tennessee.

After setting up camp, we scoped out where to best watch the eclipse while we waited for the rest of our merry band of observers to assemble. We settled on a spit of land by the lake that offered the best clear view and solid footing for our scopes. The day of the eclipse was perfect. We set up a tent and cameras on our spit of land, and I wandered down to the other piece of beachfront by the lake, curious about who was there. The place was full, but not really crowded. I found a small group on the edge of the lake who were also from New Jersey. One guy in the group told me, "I have been waiting twenty-six years to see this!" He was a middle school student in Mexico City at the time of the total eclipse there in 1991 and was really looking forward to seeing it. Then, four days before the eclipse, he and his family left for the United States. He asked his parents why they chose that day to move and they admitted that they didn't know about the eclipse at the time they got their plane tickets.

The big moment arrived and we all aimed our cameras and eclipse glasses at the Sun. There really aren't adequate words to describe what we saw. It's like nothing else that I have ever seen. It was Biblical. Magical. Like the Sun was replaced with a giant bullet hole in the sky. The corona around the Sun was the only thing lighting up. You just cannot get an appreciation of the event, or the majesty of it, by seeing a partial eclipse.

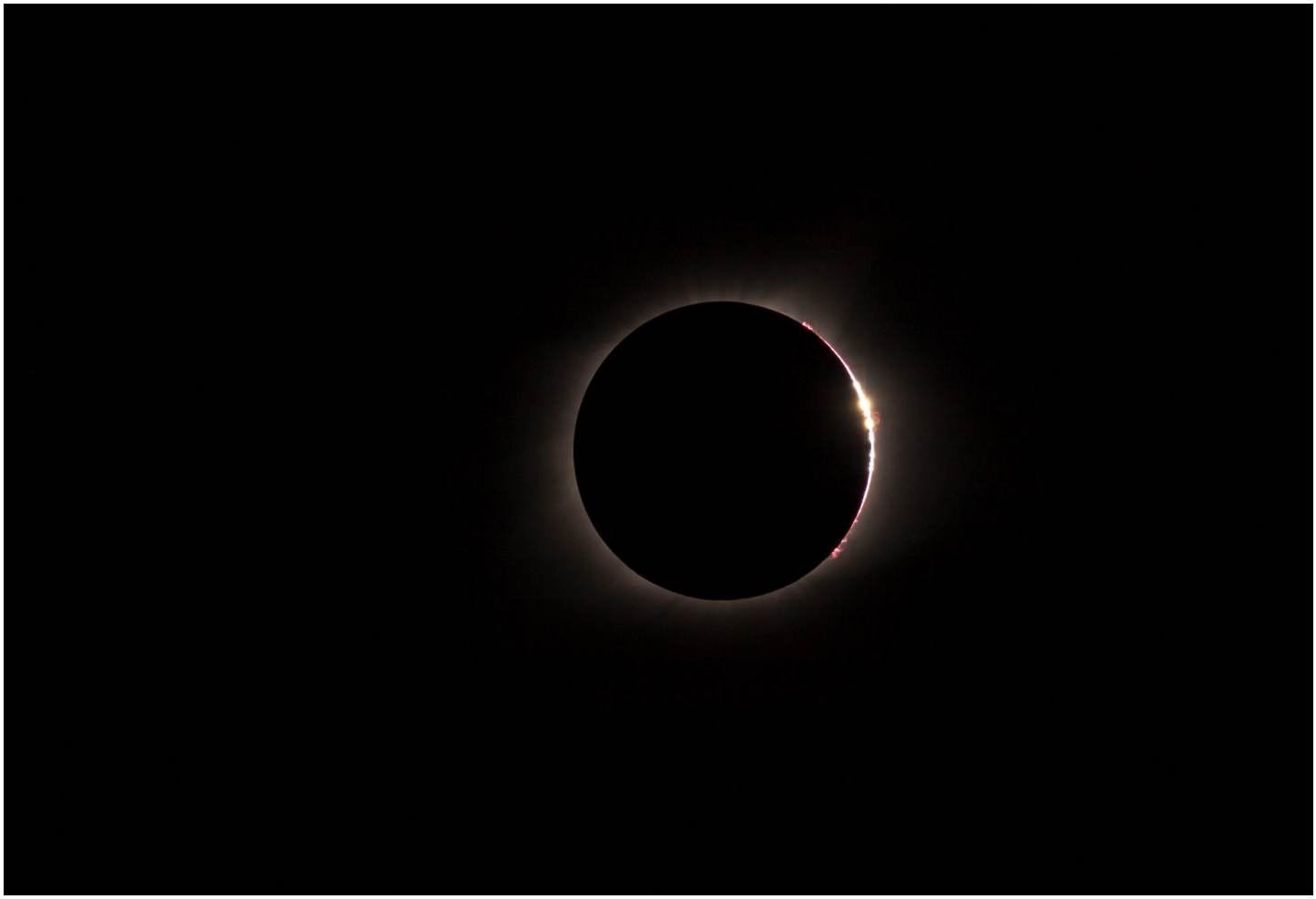
The day stayed bright until the Sun was mostly covered by the Moon—it was still daylight even with the Moon covering 90% of the Sun. It did not get appreciably darker until about 95 percent of the Sun was covered, and then even up to about 98% or so, it was still pretty light out. When the Moon covered that last bit of the Sun it was dramatic. It was nighttime! The only daylight we could see was a false horizon maybe forty miles away, where some of the sunlight was still shining on the Earth. We could see a very dim shimmer of that light glisten on the surface of the lake like a fake sunrise or sunset. The nighttime dock lights of the boat launch came on, reacting to the low light level.

I watched the first eight seconds or so of the two minutes and thirty six seconds of totality and then went to work with my cameras. It was all over much too quickly!

One piece of knowledge that I acquired during the event is that if you see a total eclipse, you are hooked! I am looking forward to the next one I might get to see. A total eclipse will travel from Texas through Ohio, upstate New York, and New England in 2024. And there is one in 2019 that will pass through Chile and Argentina…

SHAA member Nick Sperling created a video of our Tennessee eclipse adventure which you can watch at https://youtu.be/KPnvkGwvzhM. Enjoy!

More Eclipse Photos



▲ Bailey's Beads – the Sun shining through the valleys on the periphery of the Moon

◄ Sunspots were revealed as the Moon moved past the Sun

Photos taken from Portland, Tennessee by Warren Westura, SHAA

More Eclipse Photos

Photo by Michael LaMonaco, NJIT and AAI; taken from Brevard, North Carolina.

Photo by Helder Jacinto, AAI; taken from Union, New Jersey.

More Eclipse Photos

Photo by Alex Varakin, AAI; taken from Shohoni, Wyoming.

Photo by Bojidar Marinov, AAI; taken from Spring City, Tennessee.

More Eclipse Photos

Photo by Bojidar Marinov, AAI; taken from Spring City, Tennessee.

Photo by Stan Honda, AAA; taken from Madras, Oregon

More Eclipse Photos

Photo by Lisa Lohse, NWJAA; taken from Portland, Tennessee.

Photo by Stan Honda, AAA; taken from Madras, Oregon

Other News from UACNJ

Year-End Appeal

The UACNJ Board of Directors has recently identified a project for our 2017 Year-End Appeal. Stay tuned for details about the upcoming Midkiff project. We will be building a new observatory to house a 25-inch telescope for use during our public programs in 2018.

Watch for details on our website soon!

Astronomy for Kids

In addition to the Space Place newsletter from NASA, you'll find information about telescopes, plus lists of recommended books, websites, software, and more on our Astronomy for Kids page at http://uacnj.org/kidsastro.php.

Thank You!

Matt Heiss, UACNJ President

Many thanks to our Member Clubs and all the volunteer Observers, speakers, and others who help out in a variety of ways to ensure that UACNJ facilities are continually improved and maintained.

Thanks, too, to each and every donor! Whether you drop a dollar in one of our donation jars when you visit, donate items for sale in our gift shop, write a check when your group attends one of our programs, or donate cash to one of our fundraisers, your support is essential to allow us to continue to provide quality public programs.

Join the Discussion

Everyone is welcome to join the NJAstronomers list that UACNJ established more than a decade ago. Individuals and clubs from throughout NJ (and surrounding states) share information on this list. Write to NJAstronomers+subscribe@groups.io to join.

Club Reminders

- Please ensure that your club is represented at each meeting of the UACNJ Board of Directors.
- Club reps are encouraged to share news about club events via the NJAstronomers (see above) and UACNJ (Observers only) email lists.

Calendars Available for Sale

The 2018 edition of our popular calendar can be purchased at our sales desk for $10. In addition to great photographs, the calendar includes notations about astronomical events and information about UACNJ. Observers and Member Clubs interested in purchasing multiple copies for resale, and those wishing to have calendars mailed to them should write to info@uacnj.org.

Our Member Clubs

Amateur Astronomers Association of New York (AAA)
aaa.org, Brooklyn, NY

Amateur Astronomers Association of Princeton (AAAP)
princetonastronomy.org, Princeton, NJ

Amateur Astronomers, Inc. (AAI)
asterism.org, Cranford, NJ

Lehigh Valley Amateur Astronomical Society (LVAAS)
lvaas.org, Allentown, PA

Morris Museum Astronomical Society (MMAS)
mmastrosociety.org, Morristown, NJ

New Jersey Institute of Technology Club (NJIT)
astronomy.njit.edu, Newark, NJ

North Jersey Astronomical Group (NJAG)
njastro.org, Montclair, NJ

North West Jersey Amateur Astronomers (NWJAA)
nwjaa.org, Blairstown, NJ

Rockland Astronomy Club (RAC)
rocklandastronomy.com, Suffern, NY

Sheep Hill Astronomical Association (SHAA)
sheephillastro.org, Boonton, NJ

Skyland Stargazers (SSG)
skylandstargazers.tripod.com, Morris County, NJ

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