

# The Objective View

June 2012

Newsletter of the Northern Colorado Astronomical Society

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**Next Meeting: June 7 7:30 pm**

## Filters and Observing Tips

**By Randy Cunningham, AstroSystems**

## Club Business at 7:15 pm

**Coors Room, McKee Conference Center  
2000 N Boise Ave, Loveland CO**

Enter campus at 19<sup>th</sup> and Boise. Drive to Wellness Center Parking north of the buildings. Enter Wellness Center at its NW corner and proceed straight to the Coors Room.

## NCAS Programs at McKee Conference Center

July 5 Ray Warren Messenger Mission to Mercury  
Aug 2 Daniel Greenridge Bioblitz Dark Sky Volunteering

## NCAS Venus Transit Events June 5 at 4 pm to Sunset

Fossil Creek Reservoir Natural Area, Preston Middle School, Red Feather Lakes Elementary School. See [www.ncastro.org](http://www.ncastro.org) NSN Calendar for details.

## City of Fort Collins Natural Area Program

Fossil Creek Reservoir 9 pm Jun 23  
8:30 pm Jul 28  
8 pm Aug 3

Bobcat Ridge Nat Area 9:30 pm Jun 9  
9:30 pm Jul 12

<http://www.fcgov.com/naturalareas/finder/bobcat>  
<http://www.fcgov.com/naturalareas/finder/fcopenspace>

## Campground Skygazing

Hermit Park 9 pm June 16  
Jackson Lake St Park 8:30 pm June 22  
Boyd Lake St Park 9 pm June 30

## Rocky Mountain National Park Stargazing

Upper Beaver Meadows Trailhead: 8:30 pm June 15, 29.  
8:15 pm July 13, 27. 8 pm Aug 10, 24  
Estes Park Memorial Observatory: 8:30 pm June 22. 8:15 pm July 6, 20. 8 pm Aug 3

## Dark Site Observing Dates

June 8, 9, 15, 16: RMNP or other site, ask FRAC newsgroup

## Other Events

Chamberlin Observatory Open House, 7 to 10 pm  
June 23, July 28, Aug 25, Sep 22, Oct 20, Nov 17, Dec 22  
Special event: June 5 4 to 8 pm Transit of Venus  
303 871 5172 <http://www.du.edu/~rstencil/Chamberlin/>

Cheyenne Astronomical Society 7 pm June 15 Comets and Meteor Showers <http://home.bresnan.net/~curranm/>  
Weekend Under the Stars August 16-18 Foxpark Wyoming  
<http://home.bresnan.net/%7Ecurranm/wuts.html>

CSU Madison Macdonald Observatory Public Nights  
On East Drive, north of Pitkin Street  
Tuesdays after dusk if clear, when class is in session  
Plus Venus Transit June 5 afternoon

Estes Park Memorial Observatory June 16 & 30 8:30 pm,  
plus EVAS meeting 7 pm June 28 TBA  
Plus Venus Transit 4:05 to Sunset June 5  
<http://www.angelsabove.org/>

Little Thompson Observatory, Berthoud HS 7 pm June 15  
What Time Is It? Dr. Suzanne Metlay  
Plus Venus Transit 4-8:30 pm June 5  
<http://www.starkids.org>

Longmont Astronomical Society June 21 6:15 pm dinner, 7 pm program Transition of Space Travel to Private Industry  
Ray Warren La Vita Bella Coffee House 475 Main St  
<http://www.longmontastro.org/>

**May 3 Program: SWRI's Suborbital Research Initiative: First Flights. By Dr. Dan Durda**

The X-Prize Competition in 2004 was won by Burt Rutan's Spaceship One. The system was groundbreaking in its elegant engineering, cost-effectiveness, and potential for rapid turnaround. The approach made space tourism viable for a much broader segment of the population. Microgravity measured in minutes can be accumulated by parabolic flight as performed by NASA's Vomit Comet. Rutan's craft has gone to the Smithsonian, but its descendants should have their maiden flights from Spaceport America in New Mexico within a year. The Virgin Galactic craft has performed flight tests and the SpaceShip 2 has completed glide tests. It has competition from XCOR, Blue Origin, Masten, and Armadillo. These programs are novel for frequent access to space at low cost. Flight rates can support hundreds to thousands of seats and experiments flown each year. Cost is one twentieth to one tenth the cost of sounding rockets. Microgravity time is a tenfold improvement over current jets flying Zero-G, and the microgravity environment is 100 times cleaner. We will for the first time access the "ignorosphere." Off-the-shelf lab equipment can fly and researchers can operate their payloads and make adjustments to salvage an experiment. Safety/integration process is simple and fast, compared to the Space Shuttle and ISS. Flights can coordinate with events, classes, circadian rhythms. Access to samples post-flight is immediate. Disciplines to benefit are Atmospheric Sciences, Life Sciences, Earth Science and Oceanography, Space Physics, Astronomy and Solar Physics, Planetary Science, Microgravity. Flights will accomplish education, training, public outreach. They will be a technology test and demonstration. SWRI has invested over \$1.3 million from 2009-2013, with the goal to be in the forefront of next-gen suborbital research capability. Three flight experiments were created for use by their payload specialists. Contracts for flight services with XCOR and Virgin Galactic specify 8 to 17 seats, and training for payload specialists. They will conduct multiple suborbital flights, document lessons learned, and publish their results. XCOR uses a single stage winged craft which rockets to ~200,000 feet. Virgin Galactic will fly to ~350,000 feet. Specialists will have a flight suit and biomed harness. He has researched the asteroidal regolith response to hyper-G, micro-G and resettling via F-18 jet flights. He is training with Alan Stern and Cathy Olkin. They have undergone training in the centrifuge and high performance aircraft. He had 20 NASTAR centrifuge runs one day in November 2011. The 6 G profile is not extreme so a large segment of the population should be able to fly safely. We can expect the cost to decrease with the flight volume, so a taste of space should be possible for many in the foreseeable future.

For more information see:

<http://swri.org/9what/releases/2011/pressure-suit.htm>

<http://www.boulder.swri.edu/~durda/>

**From John Figoski: Keota Site Report May 16**

Michael Hotka and I were out at the old Keota site this past Monday night. Fortunately the smoke from the Ft Collins fire stayed over the foothills and we had a great night of observing - Mike checking out "flat" galaxies and me finding a bunch of new ones in Bootes and Ursa Major. We were both seeing 14.2 - 14.5 mag objects in our 12.5 inch scopes. Not too shabby.

Now the real purpose for this e-mail ...

It was disheartening to see all the oil/gas pumping site that have sprung up in the grasslands the past two years. Along Hwy 14, and I even went out to Raymer, they were scattered all around. And the trucking traffic was also surprising, though that settled down at night. Mike and I set up in the usual place and once dark you could see 12 - 15 work site lights but no gas flares. However, around 11pm or so, one big one opened up to the South, and into the night other smaller ones could be seen around the horizon (from SSE to WNW). The work lights themselves did not pose any significant concern - they just seemed like distant house lights - but the flares, particularly the bigger ones were very annoying. Yes you can (and we did) avert our eyes and kept our backs to the glare, but it's just plain annoying. And they were variable in that they would flare real bright for a few minutes and then dim down, and at some times would even go away. But they were there.

However, I think there may be a solution. The regular observing site is about 1/4 mile off CR 103 to the East in a nice flat, clear area. However, just before this area is a "drainage" hollow that has relatively flat and clear ground but, most importantly, is tucked against a nice hill similar to Owl Flats. If you set up in the SW quadrant of this hollow, then all of the sight lines to the work lights and flares are blocked. I think this would recover much of the dark sky of the Keota site.

So I'm not going to write off Keota just yet. The extra 17 miles east is easy in the car and offers better dark skies and lower Ft Collins light dome. For me that's worth it.

Let's hope "drill baby drill" takes a break for a while.

## May 20 Annular Solar Eclipse Reports

From Phil McCallum, EPMO:

Had over 150 visitors at the Estes Park Memorial Observatory with good views for most of the eclipse. About 20 minutes of being clouded out in the middle but cleared off for max and sunset. Set up on the sundial (appropriately) in front of the observatory. Got a lot of sun pics but I liked this one of Irene Little's projection screen on observatory's refractor scope.



Phil McCallum, EPMO

From Mike Prochoda:

Astronomers:

I was at a friend's house in Longmont, and we were pretty much clouded-out for the entire 40' centered on maximal eclipse. We had clear skies early, so I got some reasonable views until the solar disc was about 30% obscured, after which thick dark clouds moved in. Even though there was only about 50% cloud cover overall, they seemed to constantly overlap in the West from my location, so we didn't even get much in the way of any sucker holes. I did see about 1/3 of the solar disc during the deep crescent phase near maximum at one point, but that was about it. It did clear again near sunset, so I did get to see the last couple of minutes of the eclipse until the sun slipped behind the mountains. After that, the skies totally cleared, and I got some good views of Venus and some double stars (seeing was excellent last

night). Estes Park looked even more "iffy" than Longmont according to the last-minute weather forecasts, so I took my chances by heading down to Longmont. It turns out that was a bad decision, since I saw some great pictures (and a good weather report) posted by the people at the Estes Park Memorial Observatory during the eclipse. Oh well, chasing sucker holes can be hazardous! Hopefully that won't be the case for the Venus transit next month! Here are some photos of my equipment (Coronado 60 filter on my 80mm Jaegers refractor and a Thousand Oaks white-light filter on my 60mm refractor, which was my very first scope at age 9 years old) as well as some of the shots of the event from Longmont using my iPhone 4s and the afocal method.  
Cheers, Mike Prochoda (Estes Park)



Mike Prochoda from Longmont

Eclipse at Fossil Creek, from Jon Caldwell

The annular eclipse was a great success at Fossil Creek. From Dan Laszlo, we had scopes with 60mm Ha and 6 inch Baader filters, as well as my projection system. (Ed. Note: the Baader cell owed its secure connection to some last minute machining by Jon. Thanks! DL) Charlie Davis also had his scope with a Baader filter. Several guests also brought various pinhole systems and a binocular projection arrangement.

Conditions started out with some clouds causing concern, but throughout the event, only a couple of 10-15 minute blockages occurred. There was a little wind at times, but only my projection scope with its large screen showed any vibration, which was minor. Seeing was very good, with umbra and penumbra sunspot detail visible on the projection screen as well as through the filtered scopes.

The crowd was tremendous, estimated at 225 by Deborah Price. She and a group of volunteers had lots of activities at their table, using the materials similar to ours provided by the Night Sky Network. There were at least a half-dozen naturalists from the city also helping out. Reporters for both the Greeley Tribune and Greeley Herald were in attendance and took many pictures.

It was noteworthy that the sun projection system worked so well, with more than an dozen people able to watch the eclipse at one time. We were able to watch until the very last sliver of the sun/moon set behind Horsetooth mountain, silhouetting several antenna towers as it went. Very special thanks also to David Auter, Mary Laszlo, Charlie Davis, Paul Price, Doug Moench, Dave Karp and my wife Lynn for manning the other telescopes.

Thanks to everyone for making this a success! Jon Caldwell.



It was difficult getting time on my own scope with the huge crowd, but I got a few pics at the end, and some with a 300 mm SLR lens. Charlie

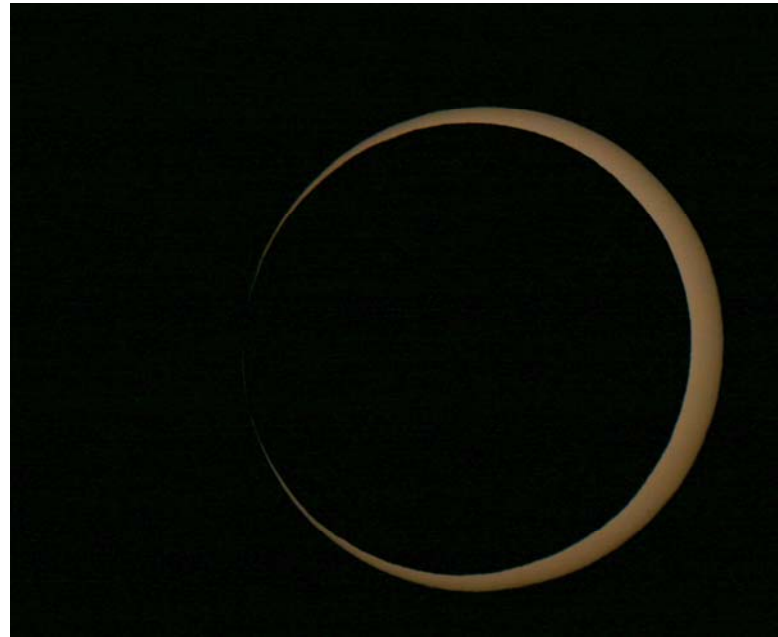
From Deborah Price: I want to reiterate the success of the event! I couldn't believe the turnout, and it was so fun to look around and see all the families having such a wonderful time. The solar glasses I had brought along were constantly being used, as well as the ones provided by Jon. Our activities kept some of the guests busy when they couldn't get to the telescopes. People LOVED the scopes, and Jon's projection system was great, allowing many people to watch at once. Thanks to all of you for a wonderful event!

From Greg Halac: Eclipse Photos from Albuquerque Festival

Long day, but exhilarating - left Fort Collins at 8:15a, home at 4:15a.

White light pictures of 1st, 2nd, 3rd contact and "annularity". Probably would have helped to practice before the eclipse, but just finished the Baader filter (thanks Jon C) for my SCT on Saturday. Focus was thru the viewfinder of my original - and "ancient" - Canon EOS 300D.

Time for bed ... Greg



Third Contact by Greg Halac, Albuquerque NM Festival

From Robert Arn: Finally, Some Solar Eclipse Images

Finally got around to processing a few of the images from the solar eclipse, so without further ado:

Full Disk H-Alpha (thanks to Dan L. for use of his H-Alpha equipment)

<http://www.astroarn.com/p910256192/h2dc284e1#h2dc284e1>

White Light 1 of 5

<http://www.astroarn.com/p910256192/h2dc284e1#h2f70dc2c>

White Light 2 of 5

<http://www.astroarn.com/p910256192/h2dc284e1#h38675b07>

White Light 3 of 5

<http://www.astroarn.com/p910256192/h2dc284e1#h4be86ec>

White Light 4 of 5

<http://www.astroarn.com/p910256192/h2dc284e1#h21509049>

White Light 5 of 5

<http://www.astroarn.com/p910256192/h2dc284e1#h15fefbe4>

Solar Eclipse Compilation

<http://www.astroarn.com/p910256192/h2dc284e1#h266f6bc7>

Solar Eclipse Compilation 2

<http://www.astroarn.com/p910256192/h2dc284e1#h390b056a>

While waiting for the Lunar Eclipse (t-minus 4 hours and counting) I finished processing a very large image of the Milky Way - or at least a good part of it. Taken from Natural Bridges National Monument, this is a 30-panel mosaic with a total integration time of 1.5 hours showcasing the bulge in the Milky Way. I collected the data for this following the solar

eclipse on May 20/21st.

<http://www.astroarn.com/deepsky/h2ae03131#h2ae03131>

Cheers, Robert Arn

Still Dazed and Confused: Road Trip to Natural Bridges National Monument, from Dan Laszlo

Maven of the Southwest, Tim Antonsen picked Natural Bridges National Monument as the site to try for the eclipse track. Chaco Canyon's ancient observatory called with its aura and even had campsites left. We stuck with NBNM for its legendary dark skies and a less dicey cloud forecast. We expected a crushing crowd at Chaco Canyon. The drive was an hour less than CCNP. Tim drove ahead of us, called from Moab that 6 of 12 campsites of the first come-first served campground were open. He then vanished like a stone tossed off Muley Point.



Robert A and Rob G at windswept Muley Point

Rob Grover caravanned with me starting at 0315 on Friday morning. My motor is getting close to 1 lunar distance, is due for its 2<sup>nd</sup> timing belt, so his company was definitely appreciated. The drive was pretty drama-free and traffic-free. Utah was windy, 15-30 mph until after dark. At the desk Joe said sites were open as of 30 min ago so we zipped out there to find a nice double site ringed by trees. Robert Arn arrived a couple hours later. We thought Tim's equipment was at one site. It turned out Paul Jones is an avid amateur from N. Carolina and had some great nights there already. A brief scouting trip showed some promise on the road NE to Hite Marina on Lake Powell. Clouds lifted in late evening so we belatedly rolled out the O 25 scope, for nice looks at Saturn and DSOs. Sky seemed to be a mag 21.8 class Friday morning. Robert Arn could use a Sherpa so we schlepped his gear to Owachomo Bridge for shooting. Out of the car I got a startle with the sudden clarity of the sky, Scorpius, Sagittarius and Corona Australis clearing the ridge to the South. The Milky Way was arcing near overhead, and the blackness of the arch was like a crack in the sky.



Paul J, Rob G, DL, Kelsey L, Phil R, Robert A at NBNM

Binocs gave a textured sky everywhere especially the plane of the galaxy. The dark rifts seemed to vary a bit and some skyglow persisted. Back to crash by 0330. Still no sign of Tim at the campsite. Of course, no simple way to communicate due to lack of cell coverage and the Web. The message board at the Visitor Center was empty. We started to figure he'd gone to explore Valley of the Gods. Saturday the Sun was active for a change and launched a floating prominence. Rob, Robert and I did a scouting trip to the SW. Rob's rafting trips were handy for background on the region. We found Martian landscapes on the road to Hall's Crossing. The Lake Powell campground had only 2 campers and there were good sites overlooking the lake. Sky Safari was handy to preview the azimuth.

A herd of horses stuck their noses in the car for a treat but we were fresh out of sugar cubes. We got more horizon shots for the library and mentally noted that could make a great place to star party once the heat lets up. We previewed the Bridge Loop in NBNM on Saturday sunset and found that the first few pullouts were clipped by a ridge. From Kachina Bridge lot on to the South was better. Robert A liked the Pygmy Forest turnoff most. It seemed to balance low horizon with some ridges for interest. Back at camp, the night started promising but seemed a little less dark. More 21.7+ territory. Robert A got a zodiacal light shot and it was strong. M44 was distinct and Omega Centari poked through gaps in the trees. My daughter Kelsey and her boyfriend Phil arrived about 2200 after a ride through spitting snow in the mountains and toasty drive after Grand Junction. The scope was warm from the day, Saturn was soft, and we stuck to eye candy DSOs like M4, 5, 6, 7, 8, 13, 20, 27, 51, 57, 65, 66, 81, 82, 97, NGC 4565. Not up so late that night, maybe 0230.



M17 by Rob Grover, Natural Bridges Natl Monument

On eclipse morning I got a chance to meet Ranger Gordon Gower. He was a Tucson teacher in High School English, started volunteering at Natural Bridges a number of years ago and now is the supervisor. He is in the perfect niche, presents star programs twice a week with their 16 inch Starmaster and enjoyed collecting scopes since 1963. The Sun and seeing were cooperating so we and his staff were able to view with a Coronado DS 90: sunspots, filaments, prominences, the works short of a flare. They have a Lunt 60 which they ran in the morning, prepared to hand out 200 sets of eclipse viewers. Papers as far as Cortez CO had featured the monument with its 6 PM program. They were in a little suspense, would they come? We let him know our plan was view and photograph at the Pygmy Forest and hoped some staff could make it.



Robert A at Pygmy Forest, Natural Bridges Natl Monument

Our vigil started about 11 am. The day was completely clear, then a teeny wisp of smoke climbed on the north horizon. Cell phones useless, we were incredulous watching it grow and engulf a lot of the ridge. Unbelievable. Over a couple hours, the hefty column of smoke churned, and then incredibly it

dwindled. No sirens or choppers and a single airplane. What a huge relief. We soon learned it was a prescribed burn, still got us rattled with fires taking their toll in the West.

Traffic was light, pavement was a little toasty, seeing was really good at noon and sustained at least decent views all afternoon. We set up a TMB 175 with older Baader Herschel Wedge, C102F with DS Coronado 90 – BF30 and Zeiss prism for viewing with equatorial mounts. Visitors quickly got clear on binoviewer use. We had Tak LE 30mm and 25mm TMB Zeiss aspheric ortho eyepieces giving full disk views throughout, did not run the power up.

Robert A ran his WO refractor with a new Baader Herschel Wedge and took telephoto and wider field shots. We had lots of photo ops and tried switching gear around. I was not a fan of solar continuum filters in the past. Robert has me keeping a more open mind after trying it on my scope. The color seems intrusive at low power, not bad at higher magnification. Suppression of atmosphere dispersion makes sense. Granulation was there +/- the filter, just some ripples at times. 3 nice sunspots could stand more power. H-alpha was showing filaments lots of striation around the spots and a few prominences around. Not long after setup, Robert shouted, "Hey look, there's Tim!" Sure enough he was climbing the hill in his turquoise Land Shark. We bizarrely managed to miss each other till then. At the Visitor Center, Ranger Gower heard he was from Ft. Collins and waved him to us.



I tried to catch 1<sup>st</sup> contact in H – alpha, traded views for a second, and, danggit! Moon was intruding when I got back to look. Before long handheld viewers picked it up. Everyone marveled at the rough edge and the quick progression. Such an inky black for the growing lunar profile. We had a steady cycle between scopes, eclipse glasses and eclipse tricks. The truck door was great for pinhole crescents. New to me were hair effects. Most amazing was the silhouette if you had short wavy hair. We saw a halo of crescents in her shadow. The scope views were detailed the disappearance of sunspots and the prominences. The big gray spots looked like lunar prominences. Venus was distinct to eye when we started to hunt around 50% coverage. Sometime after that the landscape seemed dusky, bathed in golden light. Robert A was clicking



away like a madman throughout. He did a new-to-me eclipse trick: a glowing crescent appeared on his forehead . . . thanks to his camera viewfinder and looked very festive!

Tim A announced upcoming 2<sup>nd</sup> contact, and second to third was so brief at our off-center location. Very cool to see the “horns,” but pretty brief. The Moon’s retreat seemed quicker, definitely easier to see against the chromosphere. The sunspots were back before you knew it. Very striking was the atmospheric dispersion effect on the edge of the Sun. The lower rim was red and the upper blue-green. The sunset light was warmed by a little smoke. We had that mild cognitive dissonance with the Sun dropping but its beacon was cranking up. Tim let out a whoop when a jet crossed the low disk in the scope. The Sun finally hit the first little clouds of the day. It shone through the ridgetop trees and slipped away. Leaving the a sky framed by brilliant crescent Venus and a rising Belt of Venus.

We caught up over smores at our campfire waiting for dark. Zodiacal light and the Beehive Cluster shimmered as before. Another severe clear night was underway. This time though the darkness kept getting deeper. At first, from the zenith to 45 degrees was happy hunting for galaxies. We had a little fluctuation. M51 was great. M101 less so. M 64 was decent. NGC4565 and the dust lane in NGC 4631, the Whale, was mottled nicely. We zipped through some eye candy for our tired hikers so they got a taste of the Crescent Nebula through the trees. M5 and M13 were great solo or binoviewed. Summer M objects were a treat as they rose. Paul J. had his best view of the Dumbbell Nebula and enjoyed a starry look at the B86 field. The Lagoon, Trifid, Crescent, the Veil, the Swan and the Eagle Neb were full of incredible structure. Nevertheless, after midnight, nothing in the scope was competing with the sky. Just impossible to ignore the greatest edge-on galaxy. Horizon to zenith to horizon, stars TNTC, all the rifts painted black, just jaw-dropping. The highlight of a weekend of highlights. After gawking forever, I hit the wall and reluctantly buttoned up gear. Robert A of course continued to happily shoot until dawn shut him down. What a gift we have in Natural Bridges National Monument Ready to hit the road, anybody? Dan Laszlo Ft Collins

From Rob Grover: As for sky darkness, the only way I can find to describe it is; “You had to be there.” Been lucky to see some amazing sky at WUTS, on Independence Mountain and out in Dinosaur National Monument. Sunday night at NBNM was the best I’ve ever seen, and by more than just a little bit. Ptolemy’s Cluster (M7) was a spotlight, even low in the sky. Several Messier objects were easy naked eye targets.

To add a little to Dan’s quite complete description of the area, activities and mood, I set up the ES 102 for some imaging on Saturday night. Am going to get the image processed and posted (hopefully) sometime today. All the subs look amazing, and using the iPad to shoot flat frames works fantastic! Before hooking the camera gear to the scope, I took a few minutes to do some visual scanning. Even that small aperture showed good nebulosity in M8, 20, 17 & 15. Long look at M44 - it really popped against that inky sky. Wanted to check out the Veil, but it was still behind the trees when time came to get busy imaging.

Thanks to Dan for his engaging conversation and generosity with his optics. Always a real treat sharing views with such an enthusiastic, experienced observer.

Additional thanks to Robert Arn for freely answering my imaging questions, offering a few tips and allowing me to watch as he collected data for some more upcoming masterpieces.

Finally, thanks to Tim for suggesting the area and being the initial driving force behind this journey. Wish we had been able to meet up earlier in the weekend – always enjoyable sharing dark sky time and conversation. Glad he finally made it home!

I hope to get back down to that region again this year. Thinking September - will post when I start planning the trip later this summer.

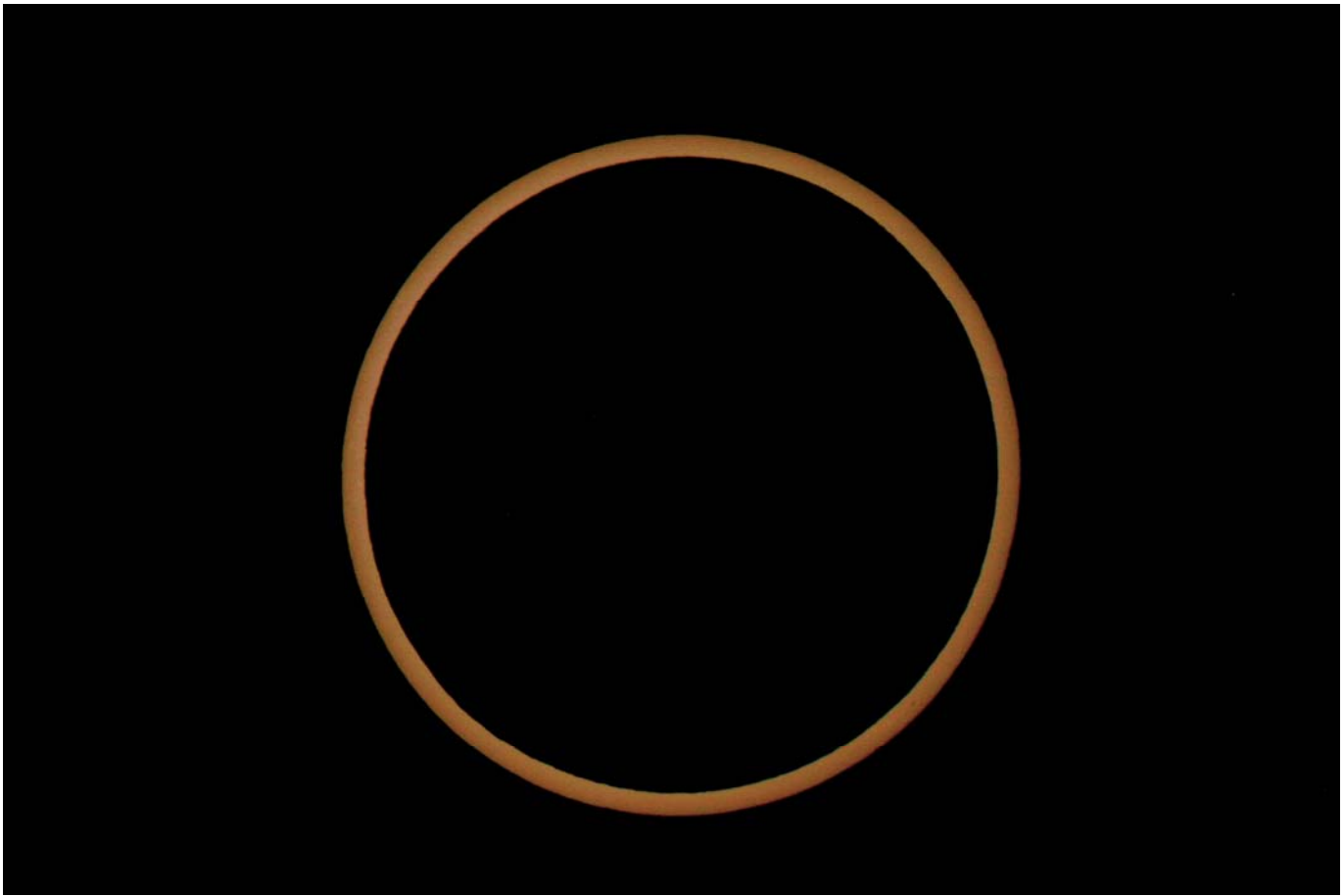
Robert Grover

**Partial Lunar Eclipse June 4 0400 MDT**

**Venus Transit June 5 1604 MDT**

**Best Looks**

- Moon By Jupiter June 17; below Venus June 18  
By Mercury June 21; by Mars June 25  
By Saturn June 27
- Mercury In WNW at dusk last half of month
- Venus Bright in ENE last half of month
- Mars In SW early evening
- Jupiter In ENE at dawn
- Saturn In S early evenings



Mideclipse by Greg Halac, Albuquerque Ring of Fire Festival

International Space Station Passes for Fossil Creek Reservoir

June 2012

Date	Brightness (mag)	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
21 Jun	-1.9	21:40:31	10°	NW	21:43:24	30°	NNE	21:46:06	11°	E
21 Jun	-1.5	23:16:52	10°	WNW	23:18:39	24°	W	23:18:39	24°	W
22 Jun	-3.4	22:22:53	10°	WNW	22:26:04	67°	SW	22:26:46	48°	SSE
23 Jun	-3.0	21:29:04	10°	NW	21:32:14	59°	NNE	21:34:53	14°	ESE
23 Jun	-0.8	23:06:30	10°	W	23:07:26	13°	WS W	23:07:26	13°	WSW
24 Jun	-2.0	22:11:46	10°	WNW	22:14:34	28°	SW	22:15:34	23°	SSW
25 Jun	-3.1	21:17:34	10°	WNW	21:20:45	59°	SW	21:23:42	11°	SE
26 Jun	-0.8	22:01:18	10°	WSW	22:02:43	12°	SW	22:04:07	10°	SSW
27 Jun	-1.6	21:06:11	10°	WNW	21:08:52	25°	SW	21:11:32	10°	S

Passes from Heavens-Above, from:

<http://www.heavens-above.com/PassSummary.aspx?satid=25544&lat=40.48322&lng=-105.01522&loc=Fossil+Creek+Reservoir&alt=1500&tz=MST>