

# The Objective View

Newsletter of the Northern Colorado Astronomical Society

October 2011

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Cheyenne Astronomical Society 7 pm Oct 21 Binocular Observing Cheyenne Botanic Gardens.

<http://home.bresnan.net/~curranm/>

CSU Madison Macdonald Observatory Public Nights

On East Drive, north of Pitkin Street

Tuesdays after dusk if clear, when class is in session

Estes Park Memorial Observatory EVAS meeting,

7 pm Oct 27 <http://www.angelsabove.org/>

Little Thompson Observatory, Berthoud 7 pm Oct 21

Space Weather, by Dr. Thomas Bogden, NOAA

<http://www.starkids.org>

Longmont Astronomical Society 7 pm Oct 17 Inside Sky

Safari, by Bill Tschumy, IHOP 2040 Ken Pratt Blvd

<http://www.longmontastro.org/>

**Next Meeting: October 6 7:30 pm**

## Constructing a Dobsonian Telescope

by Michael Hotka, Ball Aerospace

## Club Business at 7:15 pm

## Fort Collins Museum, 200 Matthews St Fort Collins CO

[http://nightsky.jpl.nasa.gov/club-view-directions.cfm?Adress\\_ID=2810](http://nightsky.jpl.nasa.gov/club-view-directions.cfm?Adress_ID=2810)

## NCAS Programs

Nov 4 Robert Arn Nightscape Imaging  
Meet at Estes Park Memorial Observatory

<http://www.aaf-epmo.org/AngelsAbove/Information/map-information.htm>

## City of Fort Collins Natural Area Program at Sunset

Fossil Cr Reservoir Oct 15, Nov 18

Bobcat Ridge Oct 21, Nov 5

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

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

## Dark Site Observing Dates

Oct 28, 29: Keota or other site, ask FRAC newsgroup

## Other Events

Chamberlin Observatory Open House, 7 to 10 pm

Oct 1, Nov 5, Dec 3

303 871 5172 <http://www.du.edu/~rstencil/Chamberlin/>

## September 1 Program: The Atacama Desert: Earth's Exoplanet, by Robert Michael

Bob enjoyed a horizon-expanding trip to Chile and Argentina. The region is to copper as Saudi Arabia is to oil. He saw San Pedro de Atacama. There is an oasis dating to pre-Inca times. He saw the world's biggest salt flat in the rain shadow of the Andes. Europeans love the area. The average elevation is equal to Long's Peak and it goes up from there. The Humboldt current suppresses thunderstorms and precipitation. There are some coastal fog communities. Monsoon rains can roll in seasonally from Bolivia. Typical aridity is off the scale. He visited in early March 2011 which is the beginning of fall. Winter is too bitterly cold to enjoy. Azimuth 360 is the tour company Bob recommends. They are a class act. Chile is a pleasant, safe country. Bob knows where NASA could fake a moon landing after his visit. He was looking at 10,000 foot badlands cliffs, with no water erosion and no macroscopic life. Chile suffered a magnitude 9.6 earthquake due to its proximity to a subduction zone. Bob's hotel was on the Tropic of Capricorn. He and 3 German tourists were led by a Frenchwoman on a trek to the altiplano. There were no plants, bugs, snakes, scorpions . . . just black volcanic sand dunes. Their objective was a several-day trek up the Rio San Pedro. They carried day packs and a van brought their other gear. He lost 10 lbs with the exercise. They saw a village of descendants of indigenous people. He saw llama petroglyphs. At 11,000 feet he saw large saguaro-like cacti. They traced a contour line. They reached a state park with fields of pampas grass. They camped by a community hall at 13000 feet. The sky was omigod dark. The Magellanic Clouds were up. Next day they toured a park with geysers. They took a 4wd truck to see the altiplano in Bolivia. Laguna Verde is a site with chemical lagoons. At 14,000 to 14,200 feet, he saw maximal desolation. There was no water, low oxygen. It was too cold and windy to sustain life. Next was the Morning Sun Geothermal Field, with lots of mudpots and steam vents. The

region at 14,500 feet features volcanic rocks and little water erosion. This is a cold desert, and wind is hellish in the winter. The Dali Desert is indeed surreal. The trekking company hostels 1-day drive apart. There were rhyolitic lava flows forming stone trees 30 feet high. They saw Laguna Colorado which was full of flamingos. They were filter-feeding algae. No fish or crustaceans live there. The Mountain of 7 Colors was a 20,100 ft peak. Heading back down, there was some bunch grass and some llamas. There was a region like Joshua Tree National Park at 12,500. At 12,000 there was a bed of fine table salt. There was a mine and buildings of salt. He saw views that were a dead ringer for Mars. Cerro Toco is a very dark site for observing, 13,085 feet. Chile is also a Saudi Arabia for sulfur. He went by roads to mines and rode to 15,000 to the trailhead. There was a massive pile of native sulfur. He was near the Atacama Large Millimeter Array. What looked like snow was ice hard as boiler plate. He went up to 17-18000 feet, saw hoodoos, and the plain of Chinontor. It was warmer than a Colorado 14er hike. Sun was brilliant, sky was blue-black from the peaks. Bob is happy to field questions and as a connoisseur of deserts, it gets his highest recommendation.

Robert Michael is a consulting geologist working on oil and gas leases. He has recently served as the NCAS President and Treasurer.

#### **From Rob Grover: Western Nebraska Stargaze VI**

Hi All – The weekend of October 1 – 2, Nebraska’s Panhandle Astronomy Club and the Agate Fossil Beds National Monument hosted the Western Nebraska Star Gaze VI. Three adventurous NCAS members decided to head north to check out the observing conditions in a different part of the country. Jolene P, David A and I met up in Cheyenne and made our way NE to Agate, about 35 miles north of Mitchell, Nebraska. The site is wonderfully dark. Nearest towns of any consequence are Harrison, NE (25 miles NNW), Mitchell (35 miles S) and Scottsbluff (50 miles SE). I didn’t notice any light domes from any of these towns. Nearby Agate is just a couple buildings and a post office. The National Monument sits along the upper reaches of the Niobrara River. The drive up is an easy one over mostly good roads. The Steagall Road in NE is a little bumpy, but paved. Still, much smoother than even the dirt road out to Keota. The way the event was organized was a little difficult logistically. Both evenings had public outreach events scheduled at the Visitor’s Center. We camped and set up for personal viewing a short drive away, but the outreach events required multiple set-ups and tear downs over the course of the weekend. First, the public outreach for both Friday & Saturday nights: Friday night, we had about 18 visitors come out to the middle of nowhere to experience the night skies. There were three SCTs set up and I had my ES 102 out that night. David was set up for imaging back at the ‘private’ area and left his scope there. He helped out with crowd control and offered loads of information to the guests. Jolene stayed at the ‘private’ area to do some solo observing. We had some great views of the typical outreach eye candy – M13, M57, M27, Double Cluster, M23, M11,

M31, Jupiter and Comet Garradd. I had my iPod running Sky Safari and the Star Seek wi-fi module attached to the mount. Wireless control of the mount was a real hit among both the visitors and the Panhandle Astro folks. I like it since I can look up a target, get the info regarding size, distance and other pertinent information, and talk about the object a bit while the telescope slews to the target. It also has the location of more transient objects like comets and asteroids, so finding them is quick and easy – a fantastic aid at outreach events. A larger crowd showed up for the Saturday evening event.

Official count was 30 people. Pretty good considering the nearest towns of any size are Harrison and Mitchell. Several people came out from the Scottsbluff / Gering area as well. Jolene and I ended up as the only telescopes set up Saturday night. We were kept quite busy and there were obviously long lines at both scopes. I was glad I decided to use the dob that night. We saw the same eye-candy from Friday’s list, but I was able to add the Veil, M51, M101, M33, M92 and NGC7789 to the list. The Park Service also scheduled some daytime programs. We attended the “Rescue of Andromeda” presentation. The entire audience consisted of the members of the Panhandle Club, Jolene and me. It was an audience participation program and we all had a great time acting out the various roles. The sky conditions were quite dark. M33 was visible naked eye. The transparency was good – I’d estimate 4.5/5. I’ve seen it better, but not by much and that was @ 10,000 ft. – not the 4400 ft. elevation of the Monument. Seeing was maybe a little better than an average night along the Front Range. Weather-wise, the only complaint was the wind. As evening fell, the breeze picked up both nights. Went from calm to about 25MPH by 10PM. Ended around midnight Friday, but persisted until after 2AM on Saturday. When we got back to the ‘private’ viewing & camping area around 11PM Friday, Jolene was in her tent, staying out of the wind. I now see why the Panhandle Club members use SCTs and very few dobs. They are much less affected by the wind. My 13.1” Telekit was the largest aperture at the event. Glad I decided to take it out there. Would have had some serious aperture withdrawal without it. Had fun with some of the Panhandle guys looking at the Veil. Some of them had never looked at it with an OIII filter. For my selfish time, I chased down a few Arp fields and some Messiers that had escaped my observing. M74 & M77 were good to see, but I wasn’t terribly impressed. Would like to get a glimpse of them through some more aperture. Some structure was evident in my dob, but I think they might get really nice with 16”+ pulling them in. Jolene found a really nice edge-on galaxy in Ursa Major. We are trying to figure out which one it is. Nice & bright with a good central bulge in her 10” dob. Observing site was grassy, near a former private residence, well away from the main park road.

Even with the wind, there was very little dust – a good thing. Not much out there to slow down the breezes at all. However, the observing / camping area had a different issue – lots of wasps. No stings, but we did engage in some wasp wrangling to get them out of Jolene’s screened gazebo. Grasshoppers were there, but in small numbers. A few large ones but most

were under an inch long. Great area for raptors! Falcons and an owl were common sightings. Friday night, we heard an unusual animal cry, followed by the hoots of the owl. Nobody knew for sure what the animal cry was but the owl was, of course, unmistakable. At sunset Friday, we were treated to a magical sight. To the west of our observing site, there is a row of trees. In the trees, there is an arched opening. Just as the sun went behind the low hills. The sky became flame orange with the trees in dark silhouette about 100 yards away. Within the opening, a deer stopped to check out the small band of observers invading its domain. Unfortunately, it left before anyone could grab a camera. What a memorable moment. The Panhandle Club folks are a great group. Most welcoming and friendly. Mark & Walter were imaging with an Astro-Tech 65mm Quadruplet on a Sirius mount. What a great little imaging tool. They got M33 on Friday night and an amazing Flame / Horsehead complex image through the wind on Saturday. There was something special about the sky around Orion on Saturday night. By the time I started exploring there, my eyes were getting tired. Only got about 3 hours sleep early Saturday morning before the heat made it impossible to stay in the camper any longer. Anyway, the Flame Nebula was really popping. It looked best to me unfiltered. Saw lots of structure in the dark lanes. From there, I tried to glimpse the Horsehead. Sky was definitely good enough to bag it in my dob, using the H-Beta filter, but my eyes just weren't up to the task by then. This was a fantastic, small gathering. Even with the logistical issues of camping / observing in one area and doing the public outreach in a different location, it was a very fun weekend. I highly recommend it and hope to attend future events there. This was the first time the National Monument hosted the event and it should get even better. Typically, there is no camping allowed within the Monument boundaries, so this was a special opportunity. There was electricity and water available at the house at the observing area and the Park Service had a porta-john available for our use. With only 4 – 5 Panhandle members present, bolstered by the 3 from NCAS (David stayed only Friday night), it was a very low-key event. Saturday temps got up to 90F and Friday night dropped into the upper 30s / low 40s. Sure sign of dry air. Had some issues with eyepiece dew on Friday night / Saturday morning. No such issues the next night. Zodiacal light Sunday morning was quite bright. Started to show itself a bit before 4AM and stretched way up, crossing the Milky Way just above Orion. Don't remember ever seeing it reach that high into the sky. Even though the sky conditions were quite dark, the constellation Cancer was obscured by the glow. However, I did get a peek at Mars in the haze. Pretty cool view – Mars is just entering the Beehive Cluster. Should get pretty interesting over the next few weeks – if you are up early (or really, really late) to check it out. Thanks to the Panhandle Astronomy Club and the National Park Service for hosting this event. Maybe next year will have more folks show up since it won't conflict with Okie-Tex.

#### **From Robert Arn: Lunar Sisters**

New image is up on my site. This time it is not a new nightscape, but rather it features the conjunction between the

moon and the M45 last Saturday night. Did a bit of VHDR work otherwise the moon would hyper-saturate the entire image. Separation between the two objects was slightly less than 2.5 degrees.

<http://www.astroarn.com/solarsystem/ha6189d2#ha6189d2>

Thanks for looking!  
Robert Arn  
www.astroarn.com

#### **Independence Mountain September 2 to 4**

From Rob Grover: Just returned from Independence Mountain. WOW! Clear & very transparent all night. 21.71 - 21.82 on the sky quality meter. Gegenschein subtle, but obvious. M33 & M13 naked eye. Dust lanes in Milky Way very sharply defined & distinct. Some haze & muck toward the east & southeast, rising about 20 - 25 degrees. Helix, Crescent and several globs were awesome in the 25. Fried my retina at the end of the night watching a shadow transit on Jupiter. Got to see the spot as it was crossing the GRS. Seeing was only OK but there were some steady periods. Hands down the best night of the summer for me. Got about 2.5 hours worth of image time on M33 as well. Don't know when I'll have time to process. Maybe today but more likely tomorrow.

Directions to Independence Mountain - Get to Cowdrey, CO - about 13 miles north of Walden in North Park. From Denver, it's Berthoud Pass, Willow Creek Pass to Walden, north to Cowdrey then west toward Lake John. Road is well marked and the only one in the middle of town. Go west about 5 miles. Right as the pavement ends, the road up Independence Mountain takes off to the north. Also well marked with a BLM type sign. As you crest the top (about 4 miles from the turnoff), Dan & Tim are set up. Dan has the big scope, and yes, utility trailers can make it up - but you might want 4WD for some of the steeper sections. There are some water diversion bumps and some mildly loose rock / gravel. Not bad. My sedan made it up with no issues and I've seen minivans up there as well. There is a cross-buck fence part way up that is an archaeological site with old tepee rings. An interesting brief stop.

From Loveland / Ft. Collins, you can go either CO14 over Cameron Pass to Walden then north to Cowdrey or US287 to Laramie, I-80 westbound for about a mile west to the West Laramie exit, then south / southwest through west Laramie, toward Woods Landing (NOT Centennial / Snowy Range). Stay on the highway through the Medicine Bow National Forest, past Foxpark and back into Colorado. As you get into North Park, there will be a Y intersection and the speed limit drops to 35. Go left about 10 miles to Cowdrey then west once you are in town. 2.5 hours going through Laramie (from Ft. Collins). Left there @ 7 this morning and was in my house right at 9:30. Traffic up the Poudre & over Cameron could be heavy today. Was fairly thick between Laramie & Ft. Collins as well.

Highly recommended and well worth the drive yesterday. Tonight's CSC is showing less transparency, though.

From Dan Laszlo: Thanks Rob for making the trek and the fine M33 shots. We had a reprise on Sat-Sunday, just take the temp down about 10 degrees and wind up about 10mph most of the evening. The Sun was great with active disk and a large prominence winding down. The afternoon ended with our ATV visitors bearing a huge pot of Cajun Boil which Tim Antonsen and I gladly sampled. Sat sunset was one for a painter, so intense. Tim went after M101 before twilight had faded, let alone the Moon, and yelled, "I've got the supernova!" It was punching through along with the faintest wisp of the galaxy nucleus confirming the field. We did the globular and OC run till moonset around 2300. The Cass OCs like 7789 were sparkling early. M51 showed well.

The Milky Way was looking more like cobwebs in a coal mine after moonset. Impossible not to gawk, and sweet 3D texture in 10x binoculars. About 10 degrees around the horizon showed a little haze. We caught M2, 3, 6, 7, 13, 15, 16, 17, 18, 22, 27, 28, 31, 32, 110. M33 was good for a long look. Comet Garadd was looking nice overhead after moonset. Tim checked the SQM which read 21.82 to 21.86 about midnight, so pretty close to Foxpark darkness. The sporadic meteors seemed to pick up Saturday night. We enjoyed galaxies NGC7331, Stephan's Quintet, NGC891, NGC 7479 with it's spiral visible at 250x. The globulars also liked the power. We got to dance with the scope around Dobson's Hole for the Blue Snowball. It was the best looking PN, with 6543 close and Saturn Nebula trailing. The Helix was nice with filter, and Tim's 30mm eyepiece with O III lit up the fine structure in the Crescent Nebula. The haze interfered some with NGC 246 and 253. Gegenschein and zodiacal band gave me more trouble on Sunday morning. I was more conscientious about mirror cooling on Sun morning and was treated with a more steady Jupiter view, too chaotic to draw readily. Gotta agree that Io shadow transit of the GRS Sat am was something I'd never caught before. Tim was chasing Hicksons and I stuck to the standbys. 2 am rolled around Sun morning and it was time to crash. Wind and cold got to us eventually, sad to let the quality photons go uncaptured in the wee hours. Here are a few Sat sunset photos.

Really hope you folks can make the trek, such rare place. Cheers, Dan Laszlo, NCAS Ft Collins.

### **From Mike Prochoda: September Star Stare, Gardner CO Sept 23**

I attended the "September Skies Star Stare" (SSSS) which was really a "mini-RMSS" star party sponsored by the CSAS, as it was situated at the site of the Colorado Springs Astronomical Society's Rocky Mountain Star Stare (RMSS) site just north of Gardner, Colorado. The official Sept. Skies Star Stare was from Thursday 9/22/11 until Sunday 9/25/11. I did not arrive until late on Friday 9/23/11 as I had to work that morning.

The observing field was occupied by about a dozen vehicles (mostly RVs) upon my arrival as the sun was just slipping below the horizon. I quickly unpacked my car and set up my Obsession 18" scope. I had to perform the second half of my setup using a red flashlight because twilight was quickly fading.

I was parked right next to Jon DeJong who was there with his son's 10" Orion dob (he is awaiting the completion of his new big dob). As astronomical twilight ended, we were treated to clear dark skies with a wonderfully marbled Milky Way. I mostly observed the usual summer and early fall "eye candy" since I didn't have time to set up my power station, my computer atlas, or DSCs due to my late arrival. We started off with a nice view of M101 and SN 1011fe which is still very bright. M101's spiral structure and star clouds were clearly visible despite it's low altitude. This was followed by magnificent views of M8, M20, M17, M22, M13, M14, M57, M27, The Veil and Crescent nebulae, M52, M103, M31,32,110, M33 (fantastic spiral structure and mottling), M76, M15, M2, M30, M 72, and several NGC open clusters in Perseus and Cassiopeia. We also observed several NGC galaxies in Pegasus and Eridanus. Other than a few occasional passing clouds and some moderate haze near the horizon, the night was excellent with above-average seeing. This pattern mostly repeated itself on both Saturday and Sunday nights which were mostly clear with above-average seeing and a few intermittent passing clouds at times.

Sunday night did start out overcast, but by 10:30 PM the skies fully cleared. On both Saturday and Sunday nights I was using SkyTools 3 Pro as a "push-to" atlas in conjunction with my Sky Commander DSCs, and honed-in on many new objects. I mostly worked on my Herschel 400 observing list, primarily the open clusters in the winter Milky Way with a few galaxies thrown in for good measure. Additionally, I "went south" and observed several galaxies and galaxy groups in Grus, Phoenix, Sculptor, and Fornax (the lower latitude of Gardner Colorado allowed these objects to skim above the southern horizon). The first two nights we observed until about 3:30 AM, but on Sunday night I was exhausted by 1:30 PM and went to bed early. We never had any rain, dew, or any other moisture, and had nice warm sunny days for the most part, with a few gentle breezes but no real winds, and the nights only dipped into the low 50s. Most of the SSSS participants left on Sunday morning (almost all of them were CSAS members), but Jon and I stayed one more night until Monday morning. Overall, a very nice short 3-night star party during a warm Fall new-moon weekend. I returned back home to overcast and drizzly skies in Estes Park on Monday afternoon. I hope those who made the trek to Okie-Tex are having equally good observing weather as we had near Gardner Colorado. I am hoping to return to Gardner for both RMSS and SSSS next year.

### **Okie-Tex Musings from Chris Casebolt**

Got back from a Thursday-Sunday trip down to the dust bowl formerly known as Camp Billie Joe. Extremely dusty

conditions combined with pretty good winds made for some frustrating days. Thankfully, the wind tended to calm at night.

Good viewing conditions, especially Thursday night late late (4:00 a.m. Friday morning), and Friday night was good, too.

Saturday night was a bit soft. Great presentation on Hubble imaging Saturday evening, and the giveaway was mercifully short -- with great prizes this year (seemed to be a fewer number of items, but the quality was upped a notch vs. last year). Thanks to Bill T. I finally got out of my Messier rut and started knocking out some great NGC stuff. He, his TEC180, and his iPad were quite the rock stars Saturday night -- seemed like he was running a nice little outreach program for many folks. I had first light with my newly-installed ServoCAT, and several other new toys from Markless Astronomics. Actually about half way through a potential CN article/review on my experiences drilling holes into my dob.

Was able to push 556x mag (Ethos 3.7 on my Obsession 18") Friday night a couple of times -- got a central star in the Ring and Cats Eye. Neat, dark, high contrast views of some globs, too. Some of my best views were from a non-intuitive combination of my Nagler 17 with a 2x Powermate (that's about 278x with 0.6 degrees true field). Nice crowd of folks as usual. 345 was the official count. Dumped my huge Sky Atlas and an old Paracorr Type I at the swap meet. Other than the long (and out-of-the-way to avoid dirt roads) drive, and the (deteriorating) conditions of the site, I'm still an Okie-Tex fan.

Way early in September next year (8-16), so will be tough to make it (also sounds like a potential scorcher).

Several outreach programs coming up in next several weeks -- hope to see many of you there.

- Chris

### **UARS Reentry Point Determined**

Bill Bard [wbard@wb-web.org](mailto:wbard@wb-web.org) to SeeSat  
show details Sep 27

The military has determined that UARS did re-enter over the south pacific. >From the NASA UARS web site:

NASA's decommissioned Upper Atmosphere Research Satellite fell back to Earth at 12 a.m. EDT (0400 GMT), as Friday, Sept. 23, turned to Saturday, Sept. 24 on the United States east coast. The Joint Space Operations Center at Vandenberg Air Force Base in California has determined the satellite entered the atmosphere over the Pacific Ocean at 14.1 degrees south latitude and 189.8 degrees east longitude (170.2 west longitude). This location is over a broad, remote ocean area in the Southern Hemisphere, far from any major land mass. The debris field is located between 300 miles and 800 miles downrange, or generally northeast of the re-entry point. NASA is not aware of any possible debris sightings from this geographic area.

### **From Andrea Schweitzer: Space Travel May Damage Eyes, from Reuters**

Space missions may damage eyes

Adam Marcus - Reuters

Astronauts experience bone and muscle loss in the weightlessness of space, and now the first study of returning space travellers' eyes suggests that prolonged amounts of time in orbit can take a significant toll on vision, although the long-term effects aren't clear.

The new study, of more than 300 astronauts in the U.S. space program, found that almost 50 per cent of those who served on long missions -- six months or more -- reported experiencing new problems with their ability to see objects near to them while in space and for some time after returning to Earth. Roughly 23 per cent of astronauts who spent shorter periods in orbit reported problems with their near vision during their missions and after getting home.

The NASA-funded researchers also did physical exams on seven male astronauts who complained of vision problems after returning from six-month tours in space. They found several signs of eye stress in all of them, including a buildup of fluid around the optic nerve, the development of folds in the bed of vessels that supply blood to the retina, flattening of the eyeball and more.

"People have been flying in space for 50 years and nobody has gone blind yet," said Dr. Tom Mader, an ophthalmologist at the Alaska Native Medical Center, in Anchorage, who led the study. "But it's still something to be concerned about," he told Reuters Health.

Mader said the effects may be due to increased pressure of the fluid surrounding the brain -- the result of less gravity than on Earth -- that fails to drain well back into the body. But the precise mechanism is unclear.

It's possible that the loss of gravity causes pressure around the optic nerve to spike, which can damage vision, Mader said. It's also possible, however, that microgravity environments cause vision problems by lowering pressure in the eye, he added.

"It's very hard for us at this point to define exactly what is causing all of this," said Mader, whose group reported its findings in the journal *Ophthalmology*.

At least one of the seven astronauts examined in the study still displayed some of the documented physical eye changes more than five years after returning from space.

Of astronauts who completed post-flight surveys, a smaller number had problems with long-distance vision while in space -- 6.6 per cent of those on short missions and 12 per cent on missions lasting more than six months.

Some 34 per cent of the astronauts on long missions and 11 per cent of those on short missions also reported "refraction" changes in their corrective lens requirements, although it's not clear whether or how long those changes lasted after returning to Earth.

NASA is conducting follow-up studies, including research on the International Space Station, to pin down the mechanism, Mader added. Scientists also will be using magnetic resonance imaging and other tests to carefully assess astronauts' vision and eye anatomy before and after missions.

David Robertson, who runs the Center for Space Physiology and Medicine at Vanderbilt University Medical Center, in Nashville, Tenn., said the extent of the eye changes was somewhat surprising.

However, he added, it's well-known that astronauts experience swelling in the face in space, as evidenced by in-flight pictures.

"There are more changes in the eyes that I might have expected, but I would imagine that the increased head-ward movement of fluid during travel in space, together with the puffiness of the face and facial tissues likely also affects the eye," Robertson said.

So far, studies of astronauts have found no permanent adverse effects on human health from long-term space missions, Robertson said.

Any mission to, say, Mars, likely would require at least 2.5 to

3 years, he added. However, no one has spent that long in space continuously.

The record for the most time spent in space in a single mission is held by Valeri Polyakov, who spent 437.7 days in 1994 and 1995 aboard the Russian Mir spacecraft while orbiting the Earth more than 7,000 times.:

### **From Tom Teters: Speeding Violation by Neutrinos at the OPERA**

And it looks like they did use High Precision GPS  
<http://static.arxiv.org/pdf/1109.4897.pdf>  
T.C. □ TomT

### **Best Looks**

Moon	By Jupiter Oct 12 and 13; by Mars Oct 21 By Venus Oct 28
Mercury	Low in W at sunset end of month By Venus last week
Venus	Low in W end of month
Mars	Approaching Regulus at month's end, ams
Jupiter	High in S middle of night. Opposition 28th
Saturn	In SE in dawn end of month
Uranus	Late in evening in Pisces
Neptune	In evening in Aquarius
Pluto	In S early in evening in Sagittarius

Date	Mag	Starts			Max. <u>Altitude</u>			Ends		
		Time	<u>Alt.</u>	<u>Az.</u>	Time	<u>Alt.</u>	<u>Az.</u>	Time	<u>Alt.</u>	<u>Az.</u>
14 Oct	-1.2	20:08:28	10	SSW	20:09:26	18	SSW	20:09:26	18	SSW
15 Oct	-1.7	19:11:06	10	S	19:13:15	17	SE	19:14:05	16	ESE
15 Oct	-0.2	20:46:01	10	WSW	20:46:24	13	WSW	20:46:24	13	WSW
16 Oct	-3.6	19:47:33	10	SW	19:50:39	78	SE	19:50:51	73	E
17 Oct	-2.5	18:49:32	10	SSW	18:52:20	32	SE	18:55:08	10	ENE
17 Oct	-1.1	20:25:36	10	W	20:27:25	24	WNW	20:27:25	24	WNW
18 Oct	-2.9	19:26:44	10	WSW	19:29:48	56	NNW	19:31:32	23	NE

Boost is planned for October 19, so check for passes after that.

ISS predictions can be obtained from:

<http://www.heavens-above.com/main.aspx?lat=40.4997&lng=-105.05736&loc=Fort+Collins+CO+USA&alt=0&tz=MST>