

Focused

The Valley of the Moon Observatory Association Newsletter
(a non-profit science and astronomy education organization)



Winter 2007

Volume X Number 1

President's Message

By George Loyer

In the coming year we will celebrate a milestone – the Robert Ferguson Observatory in operation at Sugarloaf Ridge State Park for 10 years. We started our journey with a remarkable season of observing Comet Hale-Bopp, the greatest comet of the Twentieth Century for my money. The visitors who came to share the electricity of seeing that sight night after night in the spring of 1997 inspired all of us who were nurturing this fledgling to make their experience one they would wish to repeat. In some of those efforts we found failure, in some we found success. It was not always easy to predict which result we would encounter. But always, the awesome Universe and the unreasonably enthusiastic curiosity of those who came to the observatory kept us trying.

We've come a long way in those ten years. Telescopes and cameras and classroom equipment have come and gone as they were each hailed as new opportunities for visitors and then replaced with even better. Volunteers, some with us from the beginning, some only able to help for a season, continue to be the true lifeblood of what we do.



Our relationship with the rangers who take such care of our parks has grown from barely knowing each other and likewise barely tolerating each other, to collaborating successfully because, I think, we each sense each other's dedication to our mission. And the observatory building itself, has grown almost as if alive, adding rooms, observatories, domes, and putting down the roots needed to establish a long life.

Milestones like these certainly encourage us to look back at what's been accomplished, but even more they take

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Public Viewing at Robert Ferguson Observatory

January 20, Saturday

Public Observing Night 7 pm
Public Solar Observing 11 am – 3 pm

February 17, Saturday

Public Observing Night 7 pm
Public Solar Observing 11 am – 3 pm

March 17, Saturday

Public Observing Night 8 pm
Public Solar Observing noon – 4 pm

Evening public viewing is \$2 per adult, 18 years or older, plus \$6 per car State Park fee. Donations accepted. Dress for cold nights!

For current observatory information call (707)833-6979.

Winter Classes (see Page 3)

Observing Labs

Star Birth January 14

Binaries February 9

Spring Night Sky Series

February 13 & 20

March 13 & 20

April 10 & 17

<http://www.rfo.org>

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VMOA Mission Statement

The VMOA is a group of volunteer amateur and professional astronomers organized as a non-profit association to provide educational programs about science and astronomy for students and the public. To that end, the VMOA operates the Robert Ferguson Observatory in Sugarloaf Ridge State Park in association with California State Parks.

VMOA Board of Directors

President: George Loyer
Vice President: Mark Hillestad
Treasurer: Steve Peterson
Secretary: Colleen Ferguson
Members: David Cranford
Larry McCune
Bill Russell
Gordon Spear
Cecelia Yarnell

President's Message

(continued from Page 1)

us to the future, to imagine what will be. That's not daydreaming (or night dreaming in our case), but an important activity. If we have the energy to imagine what could be, that's the first step toward making it so. We can see that the new 40-inch telescope will introduce the next generation of visitors to the sky with their feet firmly planted on the observatory floor. We know that Jack Welch will continue to bring the night sky to our visitors in a way that speaks both to their hearts and to their intellects. We can imagine that the observatory housing the Cook Robotic could be made robotic itself, allowing remote observing sessions for docents, schools and researchers. Could there finally be high speed internet access in the observatory? A more permanent radio telescope? An improved solar telescope? All are possible, and more.

I, for one, am going to enjoy watching the observatory unfold, helping it in any way that I can. I know that you, too, will continue to help us "make it so" as you have over the last 10 years. While

I am stepping down and turning over the President's job to a very capable and committed Colleen Ferguson in January, I will continue to be deeply involved in helping the observatory and our association become its future self during the next 10 years. Thank you for all of your help and all of your support.

**New VMOA
Board Member**

The Valley of the Moon Observatory Association added David Cranford to the Board of Directors on September 23, 2006. In addition to being an active docent and webmaster at RFO, David is a member of the Sonoma County Astronomical Society. His lifelong love of astronomy and physics coupled with an interest in teaching makes RFO the perfect place for him to hang out.

When he's not tinkering with RFO's CCD-equipped 14" SCT, David is working to complete his degree in Environmental Studies with an Astronomy minor at SSU.

**Year-End
Fund Raising**

Funds are needed for Project 40, a new dome, and ongoing observatory maintenance. Please include the RFO in your year-end charitable giving. Donations to VMOA and Project 40 are fully tax-deductible. Donors of \$1,000 or more to Project 40 will have their names displayed on a plaque in the West Wing that will house the new 40-inch telescope. All donations are appreciated!

Focused Via E-mail

Would you like to receive the quarterly newsletter Focused with color photos and without another piece of paper in your mailbox? If so, please send an e-mail message to cferguson@rfo.org stating that you would like to receive Focused electronically. This will save RFO money and be better for the environment. Thank you to all those who already made the switch!

Winter

2007 RFO Class Schedule

Night Sky Series

Each class includes a lecture on the constellations of the season, their history and mythology, and how to find objects within them. Learn the bright stars, deep-sky objects, and visiting planets of the summer and fall skies. After each presentation (sky conditions permitting), you will enjoy a review of the constellations in the actual night sky and learn how to find them for yourself. The constellations, and the objects within them, will be viewed through binoculars and telescopes, including the Observatory's 24-inch reflecting telescope, until or beyond 10:30 pm (depending upon interest and enthusiasm).

Winter classes will be held on Tuesdays.

7 pm start time for February 13 & 20

7:30 pm start time for March 13 & 20, April 10 & 17.

Fee: \$75 for 6-class series or \$23 for single class

E-mail: nightsky@rfo.org to reserve a space in this popular class

Observing Labs

An intensive telescope observing session after a brief presentation on the night's theme. Handouts/Observing lists provided. Attendance limited to 6.

Fee: \$30.

For reservations, email: nightsky@rfo.org

Star Birth (Winter): Diffuse Nebulae, Star Formation and Open Clusters

Sunday, January 14, 6:30 pm [Raincheck date: Wednesday, January 17]

Binaries (Winter): Binaries and Multiple Stars

Friday, February 9, 6:30 pm [Raincheck date: Monday, February 12]

PG&E Community Service Award

The Valley of the Moon Observatory Association received a \$150 community service award from PG&E. The check to VMOA was presented by June Ferguson during the November 18 Board meeting. The award was given by PG&E in recognition of June Ferguson's valuable service to the community through her volunteer work for the RFO. The community service award program was initiated to recognize the effort of individual PG&E employees and retirees through a corporate contribution. Robert Ferguson was a PG&E employee for over 30 years before his retirement.



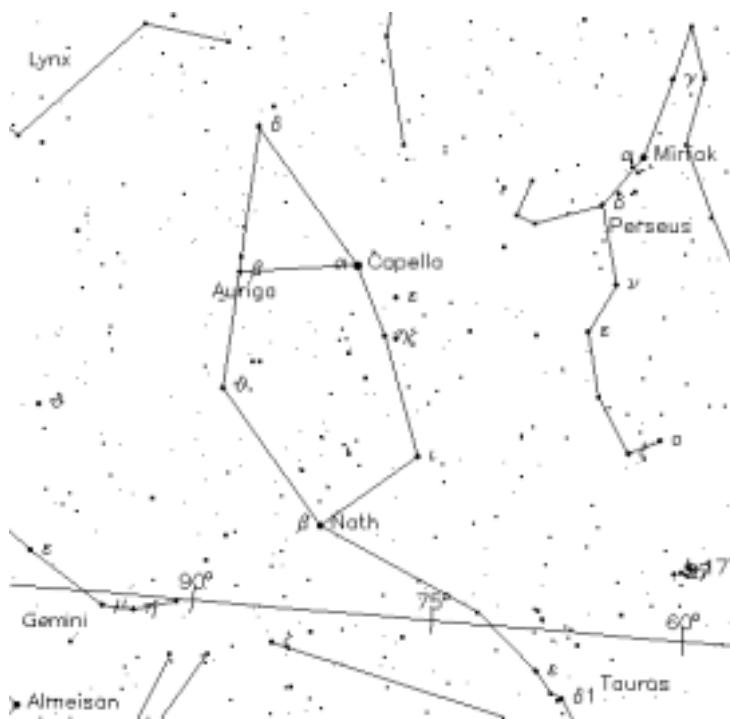
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The 2007 Winter Sky

by Jack Welch

The very bright star *Capella* (magnitude 0.08) is the northernmost star of the “*Winter Hexagon*” and brightest star of the constellation *Auriga*, the charioteer. The asterism resembles an elongated pentagon topped by a triangle on the northern edge. Also known as *alpha Aurigae*, Capella is Latin for “she-goat”. Yet another name for Capella is “*The Goat Star*”. (*Sirius*, the brightest and southernmost star of the *Winter Hexagon* exactly opposite Capella is known as “*The Dog Star*”, our two animal stars of the Hexagon!) Rather nearby at 42 light-years, Capella is a complex multiple star with at least 10 members, including a close binary of red dwarf stars.

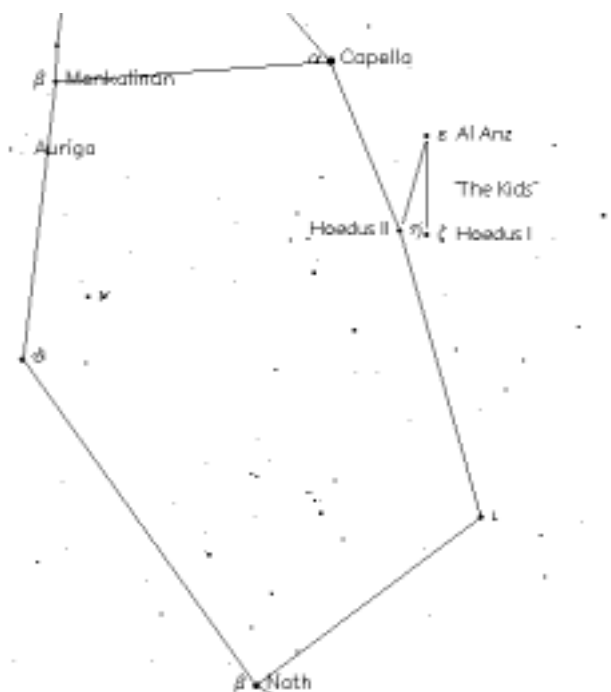


Auriga is said to represent Erichtheus, inventor of the chariot in Greek myth. Son of the blind Hephaestus, Erichtheus invented the chariot in order to transport his father about easily. As represented in Auriga, he has a she-goat slung over his shoulder. Nestled in an arm below the she-goat are her two kids. These are represented by a famous little thin triangle of stars known as “*The Kids*” just southwest of Capella. I want to draw attention to this fascinating trio of stars.

The star at the point of the triangle is *Al Anz* or *epsilon Aurigae*, which means “he-goat” from Arabic. It is a luminous giant star approximately 2,000 light-years distant. In fact, it’s one of the largest stars known, with a diameter much greater than that of Saturn’s orbit! Most remarkable, however, is

that this star is a strange and mysterious eclipsing binary... if that’s even what it is! At intervals of 9892 days (27 years) it dims from its usual magnitude 3.0 to 3.8. The eclipse(?) takes one year, evenly divided between dimming and brightening. Astronomers have no idea what it is that is happening. If it is being eclipsed, the eclipsing object must be something odd, such as a dark and very large cloud of gas that obscures but does not totally block the star’s light. Nothing else like it has been observed. The next eclipse should occur in 2010.

The pair of stars at the base of “*The Kids*” are *zeta* (on the west) and *eta* (on the east) *Aurigae*. *Zeta Aur* is also known as *Hoedus I* or *Haedi* or *Sadaton*. The first two are Latin and the third very corrupted Arabic. The meanings are, respectively, “kid (number) 1,” “the kids,” and perhaps “rein holder” or “second arm.” Once again, *zeta Aur* is an unusual eclipsing binary, though its identity as such is not disputed. About 790 light-years away, it is a close pair of orange and blue stars. During eclipse, the star dims only slightly (0.15 mag) from its usual magnitude 3.8. However, the normally orange star becomes blue during eclipse, the orange giant’s light being blocked by the blue companion! This must be something to see. The eclipse occurs every 972.176 days. I don’t know when the next occurrence will be. (If anyone out there can find a good source predicting this eclipse, email me at nightsky@rfo.org!)



Note: Magnitude 3.8 *zeta* provides a handy reference for the eclipse of *epsilon* (above).

Finally, *eta Aurigae* or *Hoedus II* (“kid #2”) is a simple, placid, non-variable star of magnitude 3.2 and 219 light-years distant.

Saturn is the highlight this winter, dominating the night sky in Leo and reaching opposition on 2/10, when it will be magnitude 0.0 with a disk of 20.3". Aim those telescopes at Saturn any crisp clear dark night you get this winter! You won't be disappointed. The moon will be near Saturn on the morning of 1/6, and on the evenings of 2/2, 3/1 and 3/28.

Jupiter is emerging from conjunction with the sun and adorning the morning skies. On the morning of 1/15 (about 5am), the moon will be very close to the red star *Antares* and also near Jupiter.

Mars, too, is emerging from behind the sun. Because it “keeps up” with Earth in orbital motion much more than the other superior planets, it only emerges slowly into the morning sky (as Earth slowly “gains” on it on our “inside track”). Still, by the end of March, it will be prominent in the east-southeast well before sunrise. From January to March, Mars moves from Ophiuchus to Aquarius.

Consistent with our theme, it seems, Venus, not to be left out, is also emerging from behind the sun and becoming the “Evening Star” once again. The moon will be near Venus on the evening of 2/19.

Mercury puts in two moderately good appearances this winter. First, it will be readily viewable in the west-southwest sky after sunset from about 1/27 to 2/12, reaching greatest elongation east on 2/7. Then, Mercury appears in the pre-sunrise east-southeast from about 3/16 to 3/28, reaching greatest elongation west on 3/21.

Besides visiting planets, the moon will pass near a couple of bright stars this winter. It will be near Regulus on the evening of 1/21, the morning of 2/3, and the evenings of 3/2 and 3/29. On that morning of 2/3, the moon will occult Regulus (here in Sonoma County, at least) at about 7:07am, the bright blue Regulus disappearing behind the moon's bright limb. Note that this is just a few minutes before sunrise, so requires a larger telescope to observe. The moon will be near Spica

at about 1am on 1/9 and 2/8, and at about 3am on 3/7. (See Jupiter, above, for a very close lunar encounter with Antares.)

February and March are good times to attempt to view the *Zodiacal Light* (reflected sunlight from fine debris in the plane of our solar system) in the sky after sunset. If you can find a location with a very dark western view (no light pollution), then the Zodiacal Light should appear as a tall, tapering, glowing, triangular region of light in the sky that follows the path of the Ecliptic in the western sky, visible around the end of astronomical twilight. (It looks somewhat like the glowing swath of the Milky Way, though dimmer.) Try looking at around 7:30pm or so from 2/4 to 2/18 or at about 8pm from 3/3 to 3/20. Note: During March, the glow of Venus will interfere somewhat with the view of the Zodiacal Light.

The last in the locally-viewable series of lunar occultations of the *Pleiades* open cluster (M45) occurs on the morning of 12/31. If you are a die-hard observer and that morning turns out to be a crystal clear night and you can't sleep, then this is the event for you! Four bright Pleiades stars will disappear behind the moon's bright limb: 16 Tau (Celaeno, m5.5) at about 3:31am; 17 Tau (Electra, m3.7) at 3:36; 19 Tau (Taygeta, m4.3) at 3:49; and 20 Tau (Maia, m3.9) at 3:56. Four stars in 25 minutes! How can you resist?

Note that Daylight Savings Time begins on 3/11 this year, earlier than usual thanks to Congress. Winter officially ends at 5:07pm on 3/20, the moment of the Vernal Equinox. By then, we'll be ready for another “Focused” newsletter!

Solar System Objects: Comparative Diameters

Earth	12,756 km
Venus	12,104 km
Mars	6,794 km
Ganymede	5,268 km
Titan	5,150 km
Mercury	4,879 km
Callisto	4,806 km
Io	3,660 km
Moon	3,475 km
Europa	3,122 km
Triton	2,706 km
136199 Eris	2,400 km (2003 UB313 ‘Xena’)
134340 Pluto	2,390 km
136472	1,600-2000 km (2005 FY9)
136108	1960x1518x996 km (2003 EL61)
90377 Sedna	1,180-1800 km
90482 Orcus	1,600 km
50000 Quaoar	1,255 km
28978 Ixion	1,200 km
Charon	1,186 km

Reserve the Observatory

Did you know you can reserve the campground and observatory facilities for private groups, company outings, or school programs? Best times to reserve for optimal sky gazing are any time more than a week away from a Full Moon. The Full Moon is in the sky for the entire night and the light from our satellite washes out most of the interesting objects one can see in a dark sky. And since it is “noon” on the Moon when it is full, you will not see the shadows that make the mountains on the Moon stand out, as you can when the Moon is in its other phases.

The Group Camp at Sugarloaf Ridge State Park is co-located with the Observatory and they must both be reserved for a private event. Reservations are made in a two step process:

1. Call Reserve America at 1-800-444-7275 or visit the Reserve America web site at <http://www.reserveamerica.com>. Be sure to reserve the Group Camp — there is Family Camping at Sugarloaf Ridge but you must have the Group Camp reserved in order to reserve the Observatory.
2. Call the Observatory at 707 833-6979 and leave a message with your name and phone number and a brief description of your group. Someone from the observatory will call you back and discuss the reservation, plan any special program features for your group, and take your credit card information for the reservation.

Reservations should be made as early as possible, and in no case less than two weeks before the date of your event. Note that the Group Camp cannot be reserved any earlier than 7 months before a given date.

From the RFO Log...

September 23 PUBLIC SOLAR VIEWING: There were no visible sunspots and not much activity in radio astronomy either. Used the SunSpotter to show how quickly the Sun appears to move across a slice of the sky that was just a little bigger than the disk of the Sun. Explained that the low visible activity on the Sun was due to the trough of the Solar cycle, but issued invitations for a probably better view in about 5 years. While we were not very successful in impressing the 76 visitors with the rarity of seeing a featureless Sun, we had a lot of very interested viewers who still found the subject interesting.

September 23 PUBLIC NIGHT VIEWING: A steady stream of 165 visitors (including 65 children) visited RFO. One group of about a dozen teenagers was from a school in Sebastopol called “Nonesuch” school. Their typical response upon looking into the eyepiece was “coool!” which was particularly satisfying to hear. We also had visitors from Germany and Ireland. Throughout the night we visited far away places ourselves including the Swan, Veil, Ring and Dumbbell nebulas, numerous globular clusters like M22, M92, M13, M2, and M30 (which we decided looks like it has legs!), and the

double cluster in Perseus. We hit most of these sights towards the end of the evening as we had a few very interested individuals still hanging around which allowed us to move the scope all over the sky in fairly rapid fashion. It was a lot of fun.

October 21 PUBLIC SOLAR VIEWING: About 75 visitors, including about 36 youngsters stopped by to see a few sun spots.

October 21 PUBLIC NIGHT VIEWING: It was a gorgeous and busy night with 160 visitors (including 56 children). The 24” focused on M-13, M-57, the double cluster in Perseus, the Andromeda Galaxy and the Pleiades. The CCD astronomers did some short live exposures and discussed some of the color archive shots in the context of stellar evolution, solar system history, cosmology, and the World Series. This pattern repeated itself with good-sized crowds until about 11 pm when the real die-hards grabbed seats and settled in for a detailed description of the imaging system.

October 22 WONDERS OF THE NIGHT SKY – STARGAZING AT TAYLOR MOUNTAIN: RFO and Sonoma County Astronomical Society volunteers partnered with LandPaths to offer public stargazing from the Agricultural Preservation and Open Space District’s Taylor Mountain Preserve. 35 participants enjoyed a hike, picnic dinner and star gazing.

November 8 MERCURY TRANSIT: Several docents observed the transit of mercury across the sun through the H-Alpha scope and with the white light filter on the 8-inch SCT. The scopes in the observatory were too low to see last contacts after 4PM.

November 18 PUBLIC SOLAR VIEWING: The radio telescope system, the H-Alpha on the Tinsley, the white-light filter on the 8-inch SCT and the SunSpotter scope were all set up for solar viewing, along with a prism to generate the double “rainbows” spectra and a sundial demonstration. Finally something to see! There was a very large sunspot whose umbra and penumbra were clearly visible. On the H-Alpha, beside the sunspot there was a nice prominence in the same field of view. It was quite faint, but most were able to see it. We had about 40 visitors, many of whom were extremely interested in the Sun and the sundial demonstrations. As usual, the little people really enjoyed the prism double spectra.

November 18 PUBLIC NIGHT VIEWING: Although the evening started pretty iffy, weather-wise, it cleared up nicely as the evening progressed. Many of the 42 visitors expressed appreciation on their way out. There was a scout group, a few local students, and an adult birthday party. Folks came all the way from Woodland and Menlo Park to visit our observatory. Most of the evening the CCD astronomers were able to image objects of interest in spite of the clouds, and even managed to get a pretty nice monochrome image of M1 by stacking a few dozen short exposures.

November 24 PUBLIC SOLAR VIEWING: Set up H-Alpha filter Tinsley, white light filter on the 8-inch Meade SCT, the SunSpotter scope and set the prism to project “rainbows. The sky was fairly clear. There were no sunspots visible, but there was one area of active prominences that appeared and then faded as the high thin clouds would move across the sky. We had about 25 visitors, most extremely interested.

Visiting a Sick Friend

By Robert Davis

Ask the average person on the street, or at least a few co-workers, how many space telescopes they can name and you will probably get a response something along the lines of “There’s more than one?” Of course the “One” everybody could name is Hubble. When asked why they knew Hubble, one response I got was, “Isn’t Hubble the one that takes those awesome pictures?” Fair enough – Hubble does take some pretty awesome pictures. Quite a few people I talk to don’t necessarily recognize the title “Pillars of Creation” but when I describe the image they all know what I’m talking about. SOHO (Solar and Heliospheric Observatory) takes some awesome pictures too (check out <http://sohowww.nascom.nasa.gov/> and follow the links to “The Best of SOHO”). When I show folks images of a prominence with an inset image of the Earth for scale, I always get a “Wow!” and SOHO even takes movies. You want to fire somebody’s imagination just show them a movie of a major coronal mass ejection. Maybe it is because Hubble has been around for over fifteen years. But then again, SOHO has been around for over eleven. So what is it about Hubble that makes it stand out? I think one of my co-workers hit the nail on the head when he said “You don’t hear about other space telescopes being brought down to crash land in the ocean”. Hubble is always making the news.

When Hubble was launched in 1990 it made a lot of news. For starters, it had the historical significance of being the first of its kind and then it made arguably even bigger headlines when it was discovered that it suffered from astigmatism – “NASA Spends a Bazillion Dollars on a Space Telescope That Can’t See Straight”. Another distinguishing mark is the fact that Hubble was designed to be serviced in space. When the first servicing mission was launched, Hubble made major headlines again. It might not have been such a big deal if the first headlines had not been generated but they were, and everybody was waiting to see if the mission could correct Hubble’s vision. Of course the mission was a complete success and Hubble’s vision was corrected to be even better than the original design specifications called for. Then we started to see the “pretty pictures” and Hubble was in everybody’s mind again. Hubble was recently brought to the forefront yet again when NASA announced it was not going risk a servicing mission to Hubble and was going to bring the telescope down. I don’t know if NASA realized what a hornet’s nest they were going to stir when they made

that announcement but there was quite an uproar. The good news is that Hubble is once again in the news because NASA has determined that with the recent successful space shuttle missions, the risk factor has been reduced enough to schedule the fourth servicing mission for Hubble.

Hubble was deployed in 1990 and has had three servicing missions to date. The first was in 1993 in which the second generation Wide Field Planetary camera was installed along with COSTAR – the Corrective Optics Space Telescope Axial Replacement, i.e. Hubble glasses. Servicing mission number two came in 1997 when Hubble received upgrades to its high resolution spectrograph and near-infrared imager/spectrograph. In 1999, the first half of the third serving mission installed a cooling system for the near-infrared detector installed in the previous mission. The second half of the third mission took place in 2002 when the Advanced Camera for Surveys was installed. Servicing mission number four will replace gyroscopes, batteries and thermal blankets – the stuff that is starting to wear out and most important to keeping Hubble flying. Hubble will also be receiving a couple new toys: the Cosmic Origins Spectrograph (COS) and the next generation Wide Field Camera (WFC3). The modest goal of these instruments is an understanding of how galaxies, stars, planets and elements needed for life such as carbon and iron were first formed and how they evolved to form the universe we all know and love.

According to NASA’s fact sheet: “After its installation during SM4, COS will restore spectroscopy to Hubble’s scientific arsenal, and at the same time provide unique new capabilities that will take the telescope into exciting, uncharted waters. With the other new Hubble instrument – WFC3, COS will lead the way on an observatory outfitted with a full suite of ground-breaking scientific instruments for the first time in fifteen years. It should be quite a journey.

Of course all good things must come to an end, and the day will come when we will have to say good bye to our old friend. For now, however, Hubble should continue to make news until 2013 when the James Webb Telescope should be ready to take over. “James Webb – isn’t he that guy that was in Dragnet?”

Valley of the Moon Observatory Association

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