



nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Beauty in things exists in the mind
which contemplates them.
David Hume

Volume 30 Number 12

nightwatch

December 2010

Club Events Calendar

January 11 – Main Branch, Ontario Library, 7 – 9 PM

January 21 – **General Meeting**

January 25 - Scout Event, Mt Baldy RV Park

January 29 – Star Party at Salton Sea.

February 9 - Magnolia Elementary, Upland, 5:30

February 10 - **Board Meeting, 6:15**

February 18 – **General Meeting - Dave Jurasevich**

February 22 – Colony Branch, Ontario Library, 6 – 8 PM

March 5 - Star Party - Mesquite Springs, Death Valley

Alternate - RAS, Landers

March 10 - **Board Meeting, 6:15**

March 18 – **General Meeting - Dave Doody**

April 2 - Star Party

April 7 - **Board Meeting, 6:15**

April 15 – **General Meeting - Christine Pearce of
Columbia Memorial Space Center**

May 6 – Wildlands Conservancy

May 7 - Star Party

May 5 - **Board Meeting, 6:15**

May 13 – **General Meeting - Albert Dicanzio PHD,
"Remembering Galileo, an Astronomer's Legacy**

May 14 - Girl Scout Camporee, 4:30

June 3 - Project Bright Sky - Cottonwood Springs

June 4 - Star Party - Cottonwood Springs

June 9 - **Board Meeting, 6:15**

June 17 – **General Meeting**

July 2 - Star Party

July 7 - **Board Meeting, 6:15**

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Vandenberg Launch

I've subscribed to Brian Webb's Launch Alerts mailing list for almost 10 years. Brian emails those on the list about upcoming astronomical events but his main focus is to share news about missile launch activity from Vandenberg Air Force Base. The AFB is located on the Pacific coast north of Santa Barbara, about 150 miles as the crow flies from Claremont. The crow tires out a bit more flying to our new place in Knights Landing, itself 20 crow-miles northwest of Sacramento, as we are now about 300 air miles distant.

From the Inland Valley over the years, I've seen a few distant lights on the western horizon, a couple of dramatic launch exhaust or cloud displays, and spent much more time going outside at the right time and seeing absolutely nothing. Launch windows range from the very short to several hours, sometimes at inconvenient times for the working diurnal among us – like between 10pm and 3am on a weeknight. It is always hard to tell through the evening twilight, when you have the best shot at a good sighting, if there is haze, smoke, clouds, or a tree in the way; or if I'm just looking in the wrong direction since I don't carry around a compass to be sure I'm looking just the right way. Of course, the other common occurrence is that the launch simply didn't happen. Probably the most common situation, though, is that I miss the email, forget to set the alarm on my cell phone, or simply get busy and forget about the whole thing.

All sorts of things are sent up from the AFB – weather and Earth imaging satellites, ballistic missiles, and test craft. Some are designed for long lives, entering Earth orbit to record and transmit observations for years; others to intercept a target launched from a far away Pacific island and to blow it to smithereens before disappearing itself beneath the waves. While most are successful, some fail by never leaving the launch pad or are rescheduled after repairs. A few make it off the pad but then encounter issues and are intentionally destroyed before they can careen off in the wrong direction.

This introduction brings me to my observations from Knights Landing. I first read about the launch in June. A first of its kind Space Based Space Surveillance (SBSS) satellite was to detect and track other orbiting space objects from a 335 mile high orbit, both the ones still in operation and the rapidly growing collection of dead satellites and orbiting debris that now surrounds our planet. The dangers from such objects are growing. The International Space Station occasionally changes its orbit to avoid an object which is uncomfortably close and you may recall the well publicized February 2009 collision between an active Iridium communications satellite and an old Russian era Kosmos satellite out of service since 1995. The 26,000 mph impact increased the number of orbiting objects from 2 large ones to many thousands of smaller bits.

The launch was delayed from October 2009 due to problems with the Minotaur IV launch vehicle. The second July 8, 2010 date was also slated to change when the rocket experienced software problems at the factory. The new date was September 25, 2010 and the launch window from 9:41 – 9:55 PM. Conveniently enough, this was also on a Saturday night. With John busy with packing tasks in Southern California, I had no

plans for the night so I set my phone alarm, got a jacket and a small red flashlight ready, and waited. Our new house is right next to the Sacramento River but between the river and the house is the levee which keeps the River effectively corralled in place (at least so far). Atop the 10-foot high earth berm is the road we take to access the outside world. I went down the driveway and walked up to the levee road. Checked my directions with a quick look for the big Dipper and the North Star then looked south and a bit east to see what I could see. At about 9:41pm, I saw a reddish planet-sized light rising slowly upward. The light appeared to go out for 10-15 seconds then was bright again and continued to rise. It got to about 20-30 degrees above the horizon then went dark around 9:44. Its magnitude was around that of Jupiter but color was definitely toward the red part of the spectrum. Success! It was exciting to get such a nice view at exactly the right time and for such a small commitment as a 2 minute walk in the dark. It was great to read the confirmation later that the launch did take place exactly when I saw the red lights and to find that the two separate lights I saw were the first and then the second stage burns of the rocket.

Emboldened by my success, I began keeping a closer eye on upcoming evening launch times and saw that on Friday, October 29th, an Italian Cosmo-SkyMed 4 Earth imaging satellite was set to launch via a Delta 2 rocket on October 29th at 7:20 PM. This launch was also first publicized in June and I scanned the Launch Alert emails for any changes. Turns out I was in for quite a ride on this one! Here's the short summary of the launch date history:

On Thursday 10/28 the launch was moved from Friday to Sunday 10/31 at 7:20 PM as the rocket propellant about to be loaded into the Delta 2 didn't meet specs.

During the countdown on 10/31 an engine heater which was to keep components warm during fueling didn't work properly and the date was moved to Monday 11/1, at the usual time.

As the last minutes ticked away on 11/1 it was found that there wasn't enough gaseous nitrogen in the Delta's engine compartment to keep components close to the cryogenic propulsion system warm. Launch rescheduled for 7:20 PM on Tuesday 11/2.

November 2nd's attempt was cancelled around 7:19 pm when low voltage was detected in a 2nd stage battery. It was decided to try again on Thursday the 4th so the Vandenberg crew had a chance to rest up after 3 straight nights of trying to get the rocket and the Cosmo into orbit.

The next delay was communicated early in the morning of the 4th and the culprit was the math of orbital mechanics. This Cosmo craft was joining three siblings launched from Vandenberg in 2007 and 2008. To correctly join the others in the satellite constellation, the date had to be moved from 11/4 to Friday 11/5 – at its usual 7:20pm time slot.

Throughout all these fits and starts, John and I tried to observe the launch on most of the dates – sometimes we missed a launch date change and waited for nothing, on most of the other dates the liftoff was cancelled only at the last minute and we'd check emails later that night or the next day to see if

Vandenberg Launch Continued

something had gone wrong or if we'd just missed it.

Fast forward now to Friday 11/5 and instead of being at our place in the country near Sacramento, John and I were again making the trek south on scenic Highway 5. I knew the next launch attempt was that night so a little after 7pm we began scoping out the upcoming freeway exits. We soon encountered Exit 305, which is just south of Kettleman City on Highway 41, the exit for the metropolis of Alpaugh (population 761). It is also a 95 mile trip for our crew from Vandenberg. We headed quickly west onto a two lane road through an almond orchard, hopped out of the car with binoculars in hand, and waited.

Over the next 10 minutes, a surprisingly large number of cars drove by, 3 to 4 of them – Alpaughians heading home after a night out with the nuts was all I could think. At 7:20:03, give or take, the lights of what appeared to be a new city lit up on the southwestern horizon. It was about 2-3 almond trees wide and its sudden arrival on the scene was soon eclipsed by the rise of the Delta 2 rocket above the trees to a height of about 20 degrees.. I kept an eye on it with my binoculars and for awhile it had a tail just like a comet. The color was reddish orange and it soon appeared to be heading away from us to the south. It alternated between a point source of light and a whitish fuzzy ball. The whole show was over in about 5 minutes and we hopped back in the van to continue our journey to Ontario. After all the attempts to see the launch from Knights Landing it was a nice reward to be so close to Vandenberg when it actually occurred.

While I recommend the Launch Alert mailing list for anyone interested in adding the possibility of seeing some man made objects to their night sky observing, there is an interesting footnote to my story. I'm sure many of you heard in the news media that on November 8th a mystery missile launch took place off the coast of Los Angeles since a KCBS helicopter captured video of the "launch." The Launch Alert site was swamped with inquiries about the event and speculation ranged from a secret military mission or an attempt to show off American military prowess during President Obama's visit to Asia, to a missile launch from a Chinese submarine off the coast of California. I imagine you have your own thoughts about the event. Go to the Space Archives link, below, to read those of Brian Webb, who operates the Launch Alert service and who, I'm sure, has seen more manmade objects take to the sky than most of us so can be said to have an educated opinion.

Claire Stover

Sign up to receive email Launch Alerts:

<http://mailman.qth.net/mailman/listinfo/launch-alert>

Launch Alert Archives:

<http://mailman.qth.net/pipermail/launch-alert/>

Iridium – Kosmos Satellite Collision:

http://en.wikipedia.org/wiki/2009_satellite_collision

Space Archive:

<http://www.spacearchive.info/>

Mystery Missile Launch Analysis:

<http://www.spacearchive.info/news-2010-11-13-bw.htm>

Comet Hale-Bopp 1995 from Death Valley National Park



Photo from Raymond Magdziarz:
This was taken on Kodachrome film then scanned.

How Does It Work?

Every reflective telescope has a primary mirror. Most have either a spherical or parabolic surface. Let's look at the simplest design, the Newtonian with a spherical primary.

Any line through the center of the sphere can be used as a reference. So all rays entering a telescope with a spherical primary are paraxial to some center line, but not necessarily the same line. All rays will therefore reflect off the mirror and converge on a surface which is half way back to the center point. Note that the focal surface is also a sphere with half the radius of the primary.

The optical tube assembly, OTA, simply constrains the rays to those which are paraxial to the center line of the mirror. The front of the OTA acts as a "field stop."

The F/# is just the focal length divided by the diameter of the primary mirror. A six inch mirror which is F/10, therefore has a 60 inch focal length. The radius of the mirror is 120 inches. And the focal "plane" is really a spherical surface with a 60 inch radius.

If the mirror were an F/4, the focal surface would have a radius of 24 inches. Thus you can see that the larger the F/#, the flatter the field will seem. The stars at the edge of the field of view will still be close to "in focus."

The magnification depends on the eyepiece and primary focal length. A high F/# allows using eyepieces with longer focal lengths.

Contrast, however, is best when a small F/# is used. Anyone who has used a camera with interchangeable lenses knows that the smaller the F/#, the faster the shutter speed. For this reason lenses are available to reduce the focal length when a camera is used.

In some designs a special lens is provided as a "field flattener." This is an attempt to convert the spherical focal surface into a plane. This is especially helpful for low F/# wide field of view photography.

Ken Crowder

What's Up? A Unicorn's Christmas Tree

While cold twinkling stars have an ornamental Christmas Tree charm, the only group so named is the Christmas Tree Cluster (NGC 2264) in Monoceros (Unicorn). It was American astronomer C. S. Copeland who saw a seasonal shape to the triangular open cluster. First catalogued by William Herschel in 1784, it's twenty light years long but 2,600 light years away. This distant cluster can be seen by powerful binoculars but a really big telescope with filters is needed to bring out its illusive emission nebulae. The most photographed part of this nebulosity is the Cone Nebula. It can be found where an angel would be on a real Christmas Tree just above the southern pointing top of the triangle. Its dark silhouetted cone is similar to the Horse Head Nebula, but visually smaller. Unlike an angel or a chess knight it looks like an upside down pointed horn. Maybe it's a black unicorn's horn.

poinsettia 5,200 light year away. This Rosetta (poinsettia) is so big it has five NGC catalogue numbers.

Other distant objects seem to be wrapped in the mystery of a Christmas package yet to be fully understood. Hubble's Variable Nebula (NGC2261) is an angelic looking nebula that varies in brightness but hides the astronomical processes that give the star within its variable cycle.

Then there's an explosive nova that won't die. In 2002 a 15 magnitude star V838 Monocerotis (60,000 ly away) suddenly brightened a million times to 6th magnitude. For a while it might have been the brightest star in the Galaxy. The Hubble telescope took a popular calendar picture of the resulting shell with its central star still burning bright. It was also designated Nova Monocerotis 2002. This explosive package may burst forth with a lot more surprises in the future.



So the open star cluster forms a pine tree triangle, but the dimmer nebula breaks up into sweeping sub-nebulae. Two that often appear in calendars are the Snowflake Nebula and the Fox Fur Nebula. They keep a holiday spirit in name but are best captured by enormous professional telescopes.

While not a flying reindeer, the constellation of the magical Unicorn is almost as hard to see. Although it lies on the Milky Way between bright Gemini, Orion, and Canis Major, it has no stars brighter than 3rd magnitude. Always a mythic clan animal (the symbol of Scotland) it didn't become a constellation until charted by the Dutch astronomer Petrus Plancius in 1624.

The Unicorn contains many other enchanted deep sky objects. The Rosetta Nebula (NGC 2237) contains its own open star cluster (NGC 2244) like the Christmas Tree. Surrounding the cluster of stars is the enormous rosy molecular emission cloud that formed them. It could be a giant red Christmas

Perhaps the strangest of all the packages under the Unicorn's tree is Plaskett's Star near the Rosetta Nebula. It's the most massive binary system known. Each star is about 50 times as big as our Sun and they sweep around a common center every 15 days. It looks like a supernova in the making, so it's a good thing it's 5,000 light years away.

So while no one has ever seen a real unicorn, you can scan the far away oddities of the faint constellation Monoceros. Remember a unicorn loves freedom and only a virgin can tame its precious horn. And don't forget that dark of the Moon Christmas present, a total lunar eclipse around midnight between December 20th and December 21. That's the Winter Solstice, a good time for a true Holiday Sacrifice.

Lee Collins







