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The Observer

The Newsletter of Central Valley Astronomers of Fresno

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Above- M28



Saturn-obviously



Astronomical Image of the Month M 13 in Hercules

Always a summer favorite, M13 was catalogued by Messier in 1764, but was actually first seen and recorded by Edmund Halley in 1713. It is a globular cluster consisting of about 300,000 stars, has a magnitude of 5.8 (it can be seen with the naked eye on a very dark clear night), is 145 light years in diameter, and is about 25,000 light years from Earth. Its best known star is V 11, a variable red giant. A lesser known fact about M 13 is that it was the test subject for the Arecibo Radio Observatory extraterrestrial message sent in 1974.

Image-NASA/ESA/HST

Important Notice-

CVA's Annual Star-B-Que has been changed to

Saturday, October 1, 2016

At Eastman Lake

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The Observer July-August 2016

The Observer is the newsletter of the Central Valley Astronomers
of Fresno

More CVA Events This Summer-2016

July 1,2,3,4-Courtright Reservoir Star Party

July 2-Eastman Lake Star Party

July 9-Riverpark Public Star Party

July 12- Star Party for Upward Bound at Reedley College

July 29,30,31-Courtright Reservoir Star Party

July 30-Millerton Lake Star Party

August 6-Eastman Lake Star Party

August 13-Riverpark Public Star Party

August 27-Millerton Lake Star Party

September 2,3,4-Glacier Point Star Party

September 2.3.4.5-Courtright Reservoir Star Party

October 1-Annual Star-B-Que at Eastman Lake

Also, public star party every Friday night at the Discovery Center

Number of extra-solar planets found as of June 2016-3,437
How many more are out there-tens of thousands?
Hundreds of thousands?

Some More Lesser Known but Still Great Summer Objects to Observe-

3C 273 in Virgo-the first quasar to be identified as such. It was first found in 1959 at the Parkes Radio Observatory in Cambridge, England. In 1963, Maartin Schmidt at Cal Tech identified it as having a redshift of .16, which meant that it was almost two billion light years from Earth. It is now known to be powered by a black hole at the center of a far distant galaxy. It has a magnitude of 12.4., and can be easily seen through a small telescope



NGC 6723 is a small globular cluster in Sagittarius, and is often overlooked in the rush to see the bigger and better known Messier globulars in that constellation. It is about 30,000 light years from Earth and has a magnitude of 6.8.

NGC 5147 is an often overlooked galaxy in the Virgo Cluster. It is an SB spiral which was first seen by William Herschel in 1784, and has a 11.7 magnitude.



NGC 6574 is another often ignored galaxy, this one in Hercules. It was first seen in 1863, is a a barred spiral, and has an magnitude of 12.1

NGC 6791 is a beautiful open cluster in Lyra. First seen in 1853, it is considered one of the oldest open clusters in the Milky Way, with some stars being up to 8 billion years old. Its magnitude is 9.5, and it is about 13,000 light years from Earth. (This cluster has been a prime observing target for the Kepler mission in recent years).



Profiles in Astronomy

Thomas Henderson 1798-1844

Henderson was born and raised in Dundee, Scotland, and trained for a career as an attorney, which he accomplished with a great success. However, he also had a strong interest in astronomy and mathematics, and developed a new method of determining longitude by using lunar occultations. This feat brought him to the attention of Thomas Young, the royal Navy's chief navigation researcher. Young helped Henderson enter the world of astronomy, and recommended him for a position at the Royal Observatory near Capetown, South Africa.

While at Capetown, Henderson made stellar observation and study his main area of interest. In 1833, a colleague at the observatory on St. Helena Island in the South Atlantic pointed out to him that the star Alpha Centauri, then believed to be the closest to the earth, had a large proper motion, and Henderson realized that its distance could be determined using the parallax method. He spent the next year gathering data, and when he returned to Scotland in 1835, his mathematics indicated that Alpha Centauri was 3.25 light years away, only 25% off from the modern accepted distance of 4.35 light years, the first known accurate distance to a star. Henderson was hesitant to publish his finding, however, because of previous discredited attempts to measure stellar distances. Eventually, in 1838, the German scientist Frederick Bessel, also using the parallax method, published a paper showing that 61 Cygni B was 10.1 light years (about 10% off the known modern distance) the first published accurate distance to a star. Stung by his hesitancy, Henderson published his findings on Alpha Centauri in 1839. Officially, he was the second person to determine the accurate distance to a star, but chronologically, he was the first.

As a result of his stellar distance studies, Henderson was named the Astronomer Royal of Scotland, and given the chair of astronomy at Edinburgh University, positions which he held until his death in 1844. He was made a member of the Royal Society in London in 1840, again on the strength of his stellar distance findings.

Source and Image-Wikipedia



Glacier Point 2016
September 2,3,4(Labor Day
Weekend)
Always the high point(literally and oth-
erwise) of CVA's observing year!



For information and reservations,
contact Dave Dutton at
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What's New in Space

The Delta IV

The news media made much of the June 11 launch of a classified National Reconnaissance Office satellite from Cape Canaveral atop a Delta IV heavy lift rocket. While the focus was on the satellite and what or what not it was, little was said about the carrier, the Delta IV HL. Only a few news outlets made light of this, with the demise of the space shuttle, currently the most powerful booster rocket in the world. It is the latest in a long and distinguished line of Delta rockets.

The Delta rockets grew out of the Air Force Thor rocket of the 1950s, and by the mid-1960s, they were one of the workhorse rockets being used to lift payloads, both scientific and commercial, into low Earth orbit. Over the years, the Delta family evolved and grew with increasing payloads and weights. Currently two versions are still being used: the Delta II, which can lift small payloads into LEO, and the Delta IV family, which is used for much heavier payloads, as well as placing satellites into Geostationary orbits (GTO). Both are built and administered by United Launch Alliance, which is a consortium of Lockheed-Martin and Boeing.

The Delta IV consists of two versions. Delta IV-M is the medium lift model. It has a single first stage rocket, the RS-68 engine, built by Rocketdyne, which uses liquid hydrogen and liquid oxygen, and delivers 660,000 pounds of thrust at liftoff. It also uses, depending on the payload, either two or four small solid booster strap-on rockets, known as GEM-60s. It can put up to 25,500 pound payloads into low earth orbit, and up to 14,500 pound payloads into geostationary orbits.

The second Delta IV version is the HL, or heavy lift. This rocket uses the Delta IV core, and attached to it, two more RS-68 rockets and their fuel tanks, making for a total of over 1.8 million pounds of thrust on liftoff. With this power, the Delta IV HL can put payloads up to 51,000 pounds into low earth orbit, and up to 29,000 pounds into geostationary orbit. As of 2016, this is the world's most powerful rocket. But it may soon be eclipsed by Space-X's Falcon HL, which will have almost 2 million pounds of thrust at liftoff, and will make its first launch in December 2016.

Currently, the Delta IV is launched at two sites. On the West Coast, SLC-6 at Vandenberg Air Force Base is used to launch Delta IV payloads, almost all classified military or intelligence satellites, into polar orbits (SLC-6, known as "Slick-6" was originally the Space Shuttle launch site during the 1980s). On the East Coast, SLC-37 at Cape Canaveral Air Force Station launches the Delta rockets into equatorial orbits.

ULA has acknowledged that the Delta IV program is struggling; the current cost of a Delta IV HL is \$400 million, out of reach of almost all but the government. In fact, all but one of the 32 launches of the Delta IV, starting in 2003, have been paid for by the U.S. government. Six more launches, again all carrying payloads paid for by the government, are scheduled between 2016 and 2020. Currently, NASA is considering using the Delta IV HL for the follow-up launches of the Orion MPCV, so there may be a few more in addition to those already scheduled. Eventually, though, the replacement for the Delta IV, the newly developed Vulcan rocket,

which is also built by ULA and will cost much less than the Delta, will have its first launch in 2019, (A future *Observer* will carry an article about the Vulcan rocket. It is scheduled to replace both the Delta and the Atlas V rockets).



First Soyuz MS Launch Delayed

The next Soyuz-ISS launching, Soyuz MS-01, originally scheduled for late May, has been postponed until at least July 2016. Engineers want to further test the systems on the newest version of the venerable Soyuz capsule before it makes its first manned flight. Currently, a crew of three, including one American, is scheduled to be launched aboard MS-01.

A little bit about the history of the Soyuz. It was first conceived in 1962 by the legendary Sergei Korelev, who was looking for a multipurpose craft that would both put cosmonauts into low Earth orbit, transport them to and from space stations, and also

send them to the Moon and back. Ironically, the original Soyuz was based on a design that General Electric proposed to NASA in 1960 as a possible Apollo craft. The first generation Soyuz craft flew from 1967 to 1971, Soyuzes 1-11. The last Soyuz mission, Soyuz 11, depressurized during reentry, killing three cosmonauts, which necessitated major engineering and design changes. The second generation craft, beginning with Soyuz 12, corrected many of the flaws of the original Soyuz, and flew in missions 12-40 through 1974. The third generation, known as Soyuz T(for transport), was designed mainly to take cosmonauts to and from the Soviet space stations during the 1970s and early 1980s. These were distinguished mostly by the lack of solar panels; they were powered by internal batteries, which saved weight, but if anything went wrong, they had to return to Earth within 48 hours of launch. The Soyuz T craft were used from 1976 to 1986. The next version, known as Soyuz TM(for Transport-Mir) was designed primarily for traveling to and from the Mir space station, and featured advanced electronics, as well as a return to the solar panels. The TM model was used from 1986 to 2003. The Soyuz TMA(for Transport-Mir-"Anthropometric") was essentially redesigned to accommodate the larger and taller American astronauts who would be using them to travel to and from ISS. The TMA series was used from 2003 to 2012. In 2010, RKA introduced the Soyuz TMA-M (for TMA "Modified")series. This had flat screen cockpit displays, a navigation and rendezvous system that allowed it to dock with ISS only a few hours after launch, the use of lightweight materials to lower the overall weight, and other improvements. Now, in 2016, comes the latest version, which is actually designated Soyuz TMA-MS, but is simply being called the MS series. The MS is expected to be the last major iteration of the Soyuz spacecraft.



A future *Observer* issue will detail the successor to the Soyuz.

The National Astronomical Observatory of Mexico

Part of a continuing series on lesser known-but still important-observatories throughout the world

The National Astronomical Observatory, known in Spanish as El Observatorio Astronomico Nacional (OAN) was established in 1878; its observing facilities were originally located at Chapultepec Castle in Mexico City. By the early 20th century, Mexico City had become too crowded and light polluted, so the telescopes were moved to Tabucaya, on the outskirts of the city. In 1948 it was determined that the entire valley in which Mexico City lay was too light and smog polluted, so the observatory was moved again, this time to Tonantzintla in the state of Puebla, in central Mexico. But by 1967, even this area was found to be too light polluted as

well, and so the observatory was moved once more, to a remote area in Baja California, known as Sierra San Pedro Martir, where the telescopes reside to this day. The observatory, administered by the National Autonomous University of Mexico, currently has three operational telescopes. The largest is a 2.12m Ritchey-Chretien reflector, and is used for both optical observing and spectroscopy. It saw first light in 1979. A second telescope is a 1.52m R-C reflector that was built and installed by the University of Arizona, and is used for optical observing, spectroscopy, and photometry. The third scope is a .81m R-C reflector, which was given to the observatory by the University of Arizona in 1968, and is also used for direct observing, spectroscopy, and photometry. It was actually the first telescope to be used at the Sierra San Pedro Martir site.

Currently, work is progressing on the San Pedro Martir Telescope, a 6.5m infrared telescope, which is expected to see first light in 2018 or 2019. It will be one of the largest infrared telescopes in the world, and will be the key component in a planned four year all sky survey beginning in 2020.



Image-the 2.12m Richey-Crietien telescope at Sierra San Pedro Martir(image from

Wikipedia)

Source-Wikipedia

NOAA's Joint Polar Satellite System (JPSS) to revolutionize Earth-watching

By Ethan Siegel

If you want to collect data with a variety of instruments over an entire planet as quickly as possible, there are two trade-offs you have to consider: how far away you are from the world in question, and what orientation and direction you choose to orbit it. For a single satellite, the best of all worlds comes from a low-Earth polar orbit, which does all of the following:

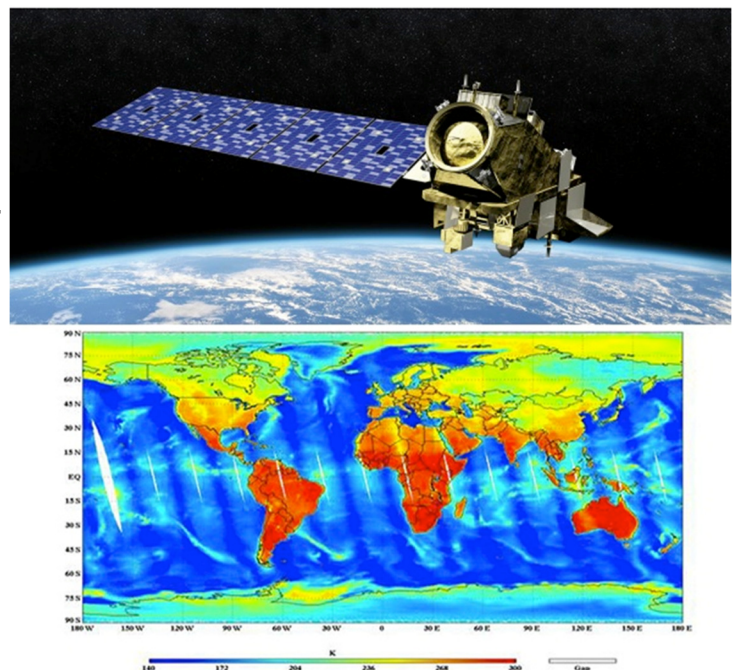
- orbits the Earth very quickly: once every 101 minutes,
- is close enough at 824 km high to take incredibly high-resolution imagery,
- has five separate instruments each probing various weather and climate phenomena,
- and is capable of obtaining full-planet coverage every 12 hours.

The type of data this new satellite – the Joint Polar Satellite System-1 (JPSS-1) -- will take will be essential to extreme weather prediction and in early warning systems, which could have severely mitigated the impact of natural disasters like Hurricane Katrina. Each of the five instruments on board are fundamentally different and complementary to one another. They are:

1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.
2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.
3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.
4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates the atmosphere.
5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling.

The JPSS-1 satellite is a sophisticated weather monitoring tool, and paves the way for its' sister satellites JPSS-2, 3 and 4. It promises to not only provide early and detailed warnings for disasters like hurricanes, volcanoes and storms, but for longer-term effects like droughts and climate changes. Emergency responders, airline pilots, cargo ships, farmers and coastal residents all rely on NOAA and the National Weather Service for informative short-and-long-term data. The JPSS constellation of satellites will extend and enhance our monitoring capabilities far into the future.

Article, image, and chart courtesy of NASA's Space Place



A Personal Memoir-And a House that Should be an International Landmark

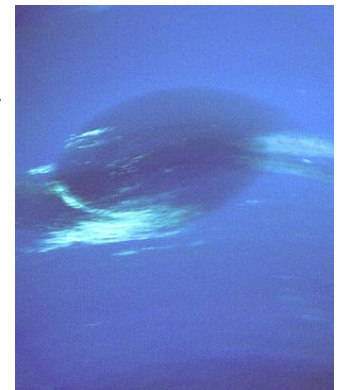
Early in June, my wife, my son, and I visited Berlin, Germany, and as a part of our stay, took a trip to Potsdam, about 30 miles southwest of the city. Potsdam was the home of the kings of Prussia and later the Kaisers of united Germany, and is most famous for the post-World War II conference between Truman, Churchill, and Stalin. As we were touring the city, our guide noted the various palaces and other historic landmarks. At one point, our tour bus turned on to a street filled with large mansions, and as we drove down it, the guide suddenly pointed to an impressive looking yellow and white house on a corner and said almost as if in passing, "And that is the house that belonged to Werhner Von Braun, the famous rocket scientist, before he moved to the United States." That Von Braun, who came from an aristocratic Prussian family, would have a residence in Potsdam is entirely logical. Unfortunately, we went by the building so quickly that I was unable to get a picture of it, but it still remains in my mind, an imposing two story mansion on a street corner in a residential area of Potsdam, the house where, in many ways, the space age began.

(Shortly after I returned from Germany to Fresno, I started reading a biography of Sergi Korolev, the head of the Soviet space program, and one of the true geniuses of modern space travel until his death in 1966. According to the book, in the late 1940s, Korolev and several of his associates traveled to Berlin to study the German V-2 rocket technology, and ironically, while there, briefly stayed at Von Braun's house in Potsdam. By that time, Von Braun was long gone to the U.S., and it had been taken over by the East German government. But it was the site where the lives of two great space pioneers of the 20th century intersected, and for that reason alone is also a special place.)

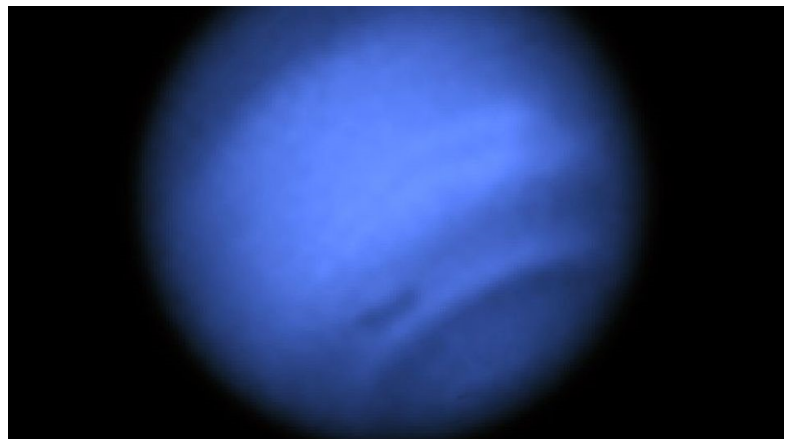


Neptune's New Storm Gives Scientists Insights

When Voyager 2 flew by Neptune in 1989, it imaged a huge storm high in the planet's atmosphere, with the strongest winds(over 1,500 mph) known in the solar system(Right-the "Great Dark Spot" as it was called. It is also known as GDS-89). However, when the Hubble Space Telescope imaged the planet in 1995, the storm had disappeared. Now, a new dark spot has appeared on Neptune; it was first noticed in September 2015, and verified in May by HST, as part of the OPAL(Outer Planet Atmospheres Legacy; an ongoing Hubble program with studies the atmospheres of the gas planets) program. NASA and the Space Telescope Science Institute released images and data concerning the event on June 23. Scientists agree that the new dark spot is a storm vortex, approximately 3,000 miles in diameter, and accompanied by several bright cloud formations similar to a hurricane or cyclone on Earth. They believe that such storms begin in either the northern or southern regions and slowly move towards the planet's equator, where they dissipate. A similar storm formed in Neptune's northern atmosphere in the mid 1990s; it seems to have disappeared in the past few years. This new storm is being carefully watched by scientists for clues as to how such events begin and eventually end. Unlike the Great Red Spot on Jupiter, which has lasted for hundreds of years, the storms on Neptune seem to last for only about 10-15 years at the most.



Right-Image of the new storm, the dark oval spot in the southern hemisphere.



Images-top right-NASA/Voyager 2

Bottom right-NASA/HST/OPAL *