January-February
2014
Volume 62
Issue 1

The Observer

The Newsletter of Central Valley Astronomers of Fresno

In this Issue:

CVA Calendar

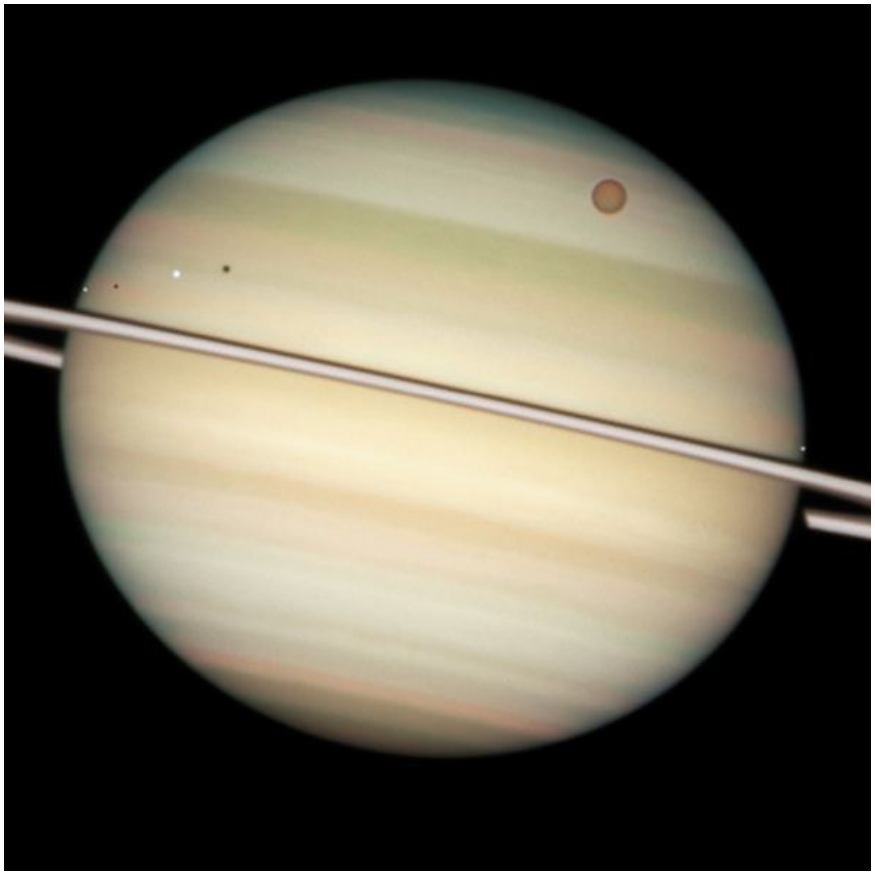
January 4-CVA star party at Eastman Lake(and the way the weather has been lately, for January, it'll be a good night)

January 18-CVA monthly meeting, 7pm, CSUF

February 1-CVA star party at Eastman Lake

February 15-CVA monthly meeting 7pm, CSUF

March 1-Messier Marathon #1 at Eastman Lake



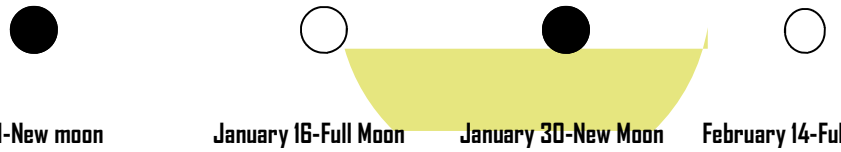
An Iconic Image from 2013

One of the many out-of-this-world images taken by the Hubble Space Telescope during 2013, this show a quadruple eclipse of Saturn by four of its moons. From left to right: Enceladus, Dione, titan, and Mimas. See more 2013 Hubble images inside.
Image-NASA/HST

Quote of the Month-

"Standing on a cooled cinder, we see the slow fading of suns, and we try to recall the vanished brilliance of the origins of the worlds..."

Georges Lemaitre, 1950



January 1-New moon January 16-Full Moon January 30-New Moon February 14-Full Moon

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

Central Valley Astronomers wishes all of its members and their loved ones a happy and prosperous 2014-may all of your viewing nights be clear, all of your stars be bright, and your telescopes be focused and accurate.

Right-the Orion Nebula, M42

Image-NASA/ESA

Profiles in Astronomy

Ernest W. Brown 1866-1938

Brown was born and raised in Hull, England, and attended Cambridge University, where he majored in mathematics. While doing graduate studies at Cambridge, he he was directed to study the papers of George William Hill, who had written extensively about the Moon and its motions. Although he did not know it at the time, this would become a major influence on his life and career.

In 1891, after he finished his graduate studies, Brown was offered a teaching position at Haverford College in Pennsylvania, and he moved to the U.S. He rose swiftly to a full professorship, and began to devote more and more time to what was called The Lunar Theory. It had been known since the ancients that the Moon's orbit is irregular; there are distortions and perturbations in its motion that for a long time were never clearly understood. A number of scientists over the years have tried to solve, or at least explain, these irregularities. Hill ,one of the best known astronomers of the time, tackled the problem, but never fully solved it. Brown decided to take up where Hill left off. Over the next several years, he worked to produce an extremely accurate ephemeris of the Sun-Earth-Moon system. He took into account gravitational forces, latitude and longitude on Earth, and even the perturbations of planets like Venus, Mars, and Jupiter. When he was offered a professorship at Yale and moved to New Haven in 1907, he continued and refined his work. Finally, in 1919, he published *Tables of the Motion of the Moon.* It was a masterpiece of celestial mechanics, and brought Brown renown from the scientific world

Brown's *Tables* became the standard for ephemerial studies, and were used all the way into the 1980s, when they were superseded by computerized tables. Brown also did work on the motion of the planets, and in 1932, the same year he retired from Yale, co-wrote a book called *Planetary Theory.* As well, he worked on the orbits and motions of the Trojan asteroids.

Brown never really went back to England, except for occasional visits to see family and friends. After he retired, he stayed in New Haven, and continued to keep an office and do research at Yale. A lifelong bachelor, he lived with his sister, who also never married. He died in New Haven in 1938, after a long illness, most likely due to the fact that he was a heavy smoker.

Source: Wikipedia, "Ernest W. Brown"

Reminder to all CVA members-be sure to pay your 2014 dues
Send them to secretary/treasurer Steve Harness
245 Swift Ave
Clovis, Ca 93612

Number of extra-solar planets found as of December 2013-1,056
How many more are out there-thousands, tens of thousands, hundreds of thousands?

CVA Calendar January-February 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			January 1 New Moon New Year's Day	2	3 Spirit rover lands on Mars 2014	4 CVA Eastman Lake Star Party
5	6	7	8	9	10	11
12	13	14 Feast of the Epithany-Orthodox New Year	15	16 Full Moon	17	18 Monthly CVA meeting 7pm CSUF
19	20 Martin Luther King Day	21	22	23	24	25 Opportunity rover lands on Mars 2004
26	27 47th anniversary of Apollo 1 fire	28 28th anniversary of Challenger disaster	29	30 New Moon Chinese New Year	31 56th anniversary of launching of Explorer 1	February 1 11th anniversary of Columbia disaster CVA Eastman Lake Star Party
2 Groundhog Day	3	4	5	6	7	8
9	10	11	12 Lincoln's Birtday-Also Darvin's birtday -1809	13	14 Full Moon Valentine's Day	15 Monthly CVA meeting 7pm CSUF Galileo's birthday 1564
16	17 Presidents' Day	18	19 Copernicus' Birthday-1473	20 52d anniversary of John Glenn's Friendship 7 flight-1962	21	22 Washington's Birthday
23	24	25	26	27	28	March 1 Messier Marathon

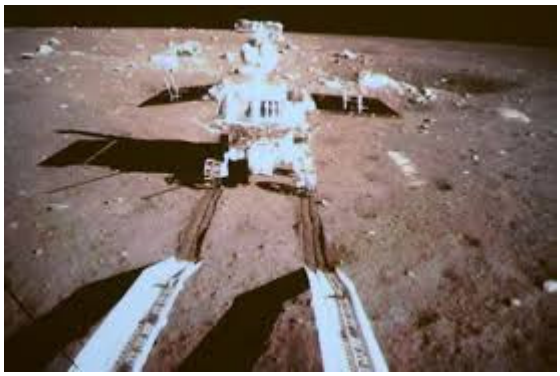
What's New in Space

Virgin Galactic Ready to Fly?

Virgin Galactic Owner Richard Branson announced in November 2013 that his SpaceShip 2 and White Knight 2 were almost finished with FFA certification, and he hoped to begin commercial sub-orbital space flights by the summer of 2014. Branson seemed confident that this target date could be met, mostly to reassure over 300 prospective customers who have put down deposits and have been waiting literally for years to go into space. Originally, SS2 and WK2 were scheduled to make their first paying commercial flights in 2011, but one testing delay after another, as well as a drawn-out FFA certification process have caused some to wonder if the program will ever get off the ground at all. SS2 tested its rocket engines for the first time in September, and in early 2014 will undergo high altitude testing. If all goes well, the first commercial flight, with Branson and Scaled Composites founder Burt Rutan as passengers, could take place as early as October. After initial flights from the Mojave Spaceport in the Southern California desert, Virgin Galactic will move its operations to a facility in New Mexico. At first, flights will cost up to $200, 000 each, but the price will probably come down after a few years, and also when several other companies enter the commercial manned spaceflight market by 2020.

China Goes to the Moon

China became the third nation after the U.S. and Russia to land spacecraft on the Moon when its Chang'e 3 spacecraft, launched on December 2, touched down on the lunar surface on December 14. In addition, the lander carried an unmanned rover named Kubo, or Jade Rabbit, which is intended to explore the lunar surface for up to a month. The Chinese space agency released images of the rover going down the ramp of the lander and traveling over the surface of the Moon. The Moon lander and rover are the latest steps in China's long range space program, leading to a lunar soil sample return mission in 2017, and a possible manned moon landing by 2020. The Chinese gave no indication as to when their next major space mission will occur. It is widely believed that the next manned flight will take place in late spring or early summer of 2014.



ISS Crew Prepares for Year-Long Mission

While the standard crew assignment for an ISS mission lasts between 4-6 months, two men, American Scott Kelly and Russian Mikhail Kornyienko, are currently training to spend a full year in orbit, starting in March 2015. They will be launched aboard a Soyuz TMA-M spacecraft, and will stay aboard the space station until early April 2016. They, however, will not set a record for the longest single stay in space. Three Russian cosmonauts spent a year or more aboard the Russian space station Mir in the 1990s, including Dr. Valeri Polyakov, who holds the current record of 439 consecutive days in space(January 1994 to March 1995).

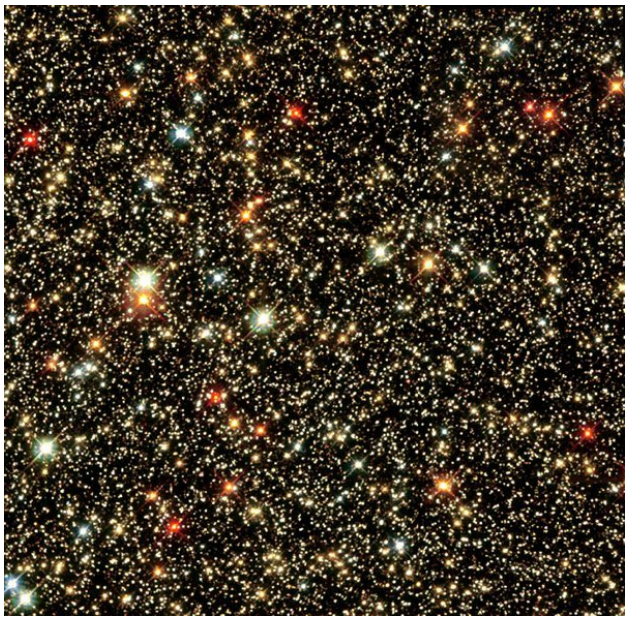
2015 will also see another unique event aboard ISS. Sarah Brightman, the British actress and singer best known for her role in the popular musical *Cats*, has purchased a seat aboard Soyuz TMA-18M as a commercial paying passenger(the first in several years), and will spend ten days at the space station in September 2015, where she, with the help of the other crewmembers, will give a live musical concert from space. One assumes that she'll be more successful than Madonna or Lance Bass, both of whom tried to fly to ISS, but were rejected by RKA, the Russian space agency(most likely with good reason).

Great Hubble Images from 2013

23 years in service, and the Hubble Space Telescope is still the best around-nothing, not even the newest large ground-based telescopes, comes close to it in both scientific discovery and sheer poetic and artistic wonder. Here, then, is a menagerie of Hubble images taken in 2013(and since when has not been a good year for Hubble images?), and may the venerable telescope keep those pixels working for many years to come.

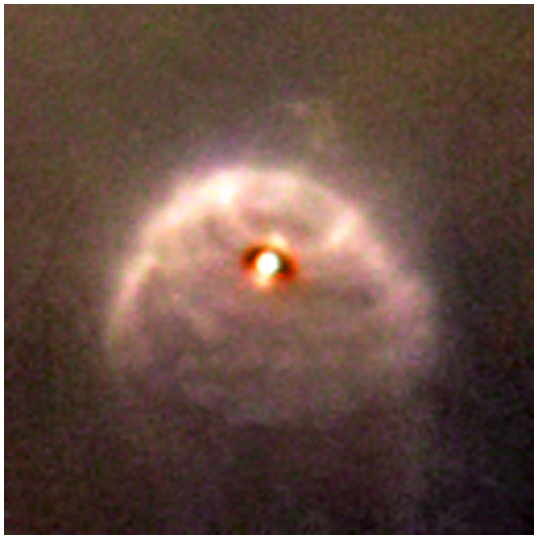
Left-Comet ISON 2013

Right-the star cloud in Sagittarius, in rich and awe-inspiring detail



Left-a Pillar of Creation in the Carina Nebula

Right-M83, the Pinwheel Galaxy, in Hydra



Left-a protostar, still in its dust and gas cocoon, in the Orion Nebula

And finally, right-the beautiful, haunting Horsehead Nebula, taken in infrared. Perhaps the Image of the Year.

Hubble Space Telescope Sees Evidence of Water Vapor Venting off Jupiter Moon

NASA's Hubble Space Telescope has observed water vapor above the frigid south polar region of Jupiter's moon Europa, providing the first strong evidence of water plumes erupting off the moon's surface. Previous scientific findings from other sources already point to the existence of an ocean located under Europa's icy crust. Researchers are not yet fully certain whether the detected water vapor is generated by erupting water plumes on the surface, but they are confident this is the most likely explanation.

Should further observations support the finding, this would make Europa the second moon in the solar system known to have water vapor plumes. The findings are being published in the Dec. 12 online issue of Science Express, and reported at the meeting of the American Geophysical Union in San Francisco.

"By far the simplest explanation for this water vapor is that it erupted from plumes on the surface of Europa," said lead author Lorenz Roth of Southwest Research Institute in San Antonio. "If those plumes are connected with the subsurface water ocean we are confident exists under Europa's crust, then this means that future investigations can directly investigate the chemical makeup of Europa's potentially habitable environment without drilling through layers of ice. And that is tremendously exciting."

In 2005, NASA's Cassini orbiter detected jets of water vapor and dust spewing off the surface of Saturn's moon Enceladus. Although ice and dust particles have subsequently been found in the Enceladus plumes, only water vapor gases have been measured at Europa so far.

Hubble spectroscopic observations provided the evidence for Europa plumes in December 2012. Time sampling of Europa's auroral emissions measured by Hubble's imaging spectrograph enabled the researchers to distinguish between features created by charged particles from Jupiter's magnetic bubble and plumes from Europa's surface, and also to rule out more exotic explanations such as serendipitously observing a rare meteorite impact. The imaging spectrograph detected faint ultraviolet light from an aurora, powered by Jupiter's intense magnetic field, near the moon's south pole. Excited atomic oxygen and hydrogen produce a variable auroral glow and leave a telltale sign that are the products of water molecules being broken apart by electrons along magnetic field lines.

"We pushed Hubble to its limits to see this very faint emission. These could be stealth plumes, because they might be tenuous and difficult to observe in the visible light," said Joachim Saur of the University of Cologne, Germany. Saur, who is principal investigator of the Hubble observation campaign, co-wrote the paper with Roth.

Roth suggested that long cracks on Europa's surface, known as lineae, might be venting water vapor into space. Cassini has seen similar fissures that host the Enceladus jets.

One explanation for the variability is that these lineae experience more stress as gravitational tidal forces push and pull on the moon and open vents at larger distances from Jupiter. The vents are narrowed or closed when the moon is closest to the gas-giant planet. "The apparent plume variability supports a key prediction that Europa should tidally flex by a significant amount if it has a subsurface ocean," said Kurt Retherford, also of Southwest Research Institute.

The Europa and Enceladus plumes have remarkably similar abundances of water vapor. Because Europa has a roughly 12 times stronger gravitational pull than Enceladus, the minus-40-degree-Fahrenheit (minus-40-degree-Celsius) vapor for the most part doesn't escape into space as it does at Enceladus, but rather falls back onto the surface after reaching an altitude of 125 miles (201 kilometers), according to the Hubble measurements. This could leave bright surface features near the moon's south polar region, the researchers hypothesize.

"If confirmed, this new observation once again shows the power of the Hubble Space Telescope to explore and opens a new chapter in our search for potentially habitable environments in our solar system," said John Grunsfeld, an astronaut who participated Hubble servicing missions and now serves as NASA's associate administrator for science in Washington. "The effort and risk we took to upgrade and repair Hubble becomes all the more worthwhile when we learn about exciting discoveries like this one from Europa."

From nasa.com December 12, 2013

The Big Picture: GOES-R and the Advanced Baseline Imager

By Kieran Mulvaney

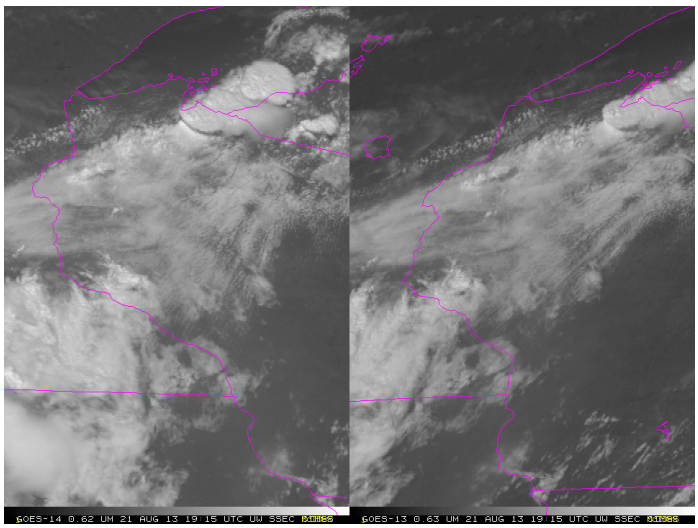
The ability to watch the development of storm systems – ideally in real time, or as close as possible – has been an invaluable benefit of the Geostationary Operational Environmental Satellites (GOES) system, now entering its fortieth year in service. But it has sometimes come with a trade-off: when the equipment on the satellite is focused on such storms, it isn't always able to monitor weather elsewhere.

"Right now, we have this kind of conflict," explains Tim Schmit of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). "Should we look at the broad scale, or look at the storm scale?" That should change with the upcoming launch of the first of the latest generation of GOES satellites, dubbed the GOES-R series, which will carry aloft a piece of equipment called the Advanced Baseline Imager (ABI).

According to Schmit, who has been working on its development since 1999, the ABI will provide images more frequently, at greater resolution and across more spectral bands (16, compared to five on existing GOES satellites). Perhaps most excitingly, it will also allow simultaneous scanning of both the broader view and not one but two concurrent storm systems or other small-scale patterns, such as wildfires, over areas of 1000km x 1000km.

Although the *spatial* resolution will not be any greater in the smaller areas than in the wider field of view, the significantly greater *tempora*l resolution on the smaller scale (providing one image a minute) will allow meteorologists to see weather events unfold almost as if they were watching a movie.

So, for example, the ABI could be pointed at an area of Oklahoma where conditions seem primed for the formation of tornadoes. "And now you start getting one-minute data, so you can see small-scale clouds form, the convergence and growth," says Schmit.



In August, Schmit and colleagues enjoyed a brief taste of how that might look when they turned on the GOES-14 satellite, which serves as an orbiting backup for the existing generation of satellites.

"We were allowed to do some experimental imaging with this one-minute imagery," Schmit explains. "So we were able to simulate the temporal component of what we will get with ABI when it's launched."

The result was some imagery of cloud formation that, while not of the same resolution as the upcoming ABI images, unfolded on the same time scale.

This article is from NASA's *Space Place*, managed and edited by Laura Lincoln. Many thanks to Laura and the *Space Place* contributors.

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The Observer

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Deadline for articles submission for the March-April 2014 issue

February 20

Please submit articles in Microsoft Word format

Mount Stromlo Observatory in Australia

Until the advent of the Andes observatories in South America in the 1970s, Mount Stromlo, in Australia just outside the capital city of Canberra, was the leading observatory in the southern hemisphere. Established in 1924, it has played a major role in the discovery and surveying of the objects in the southern skies.

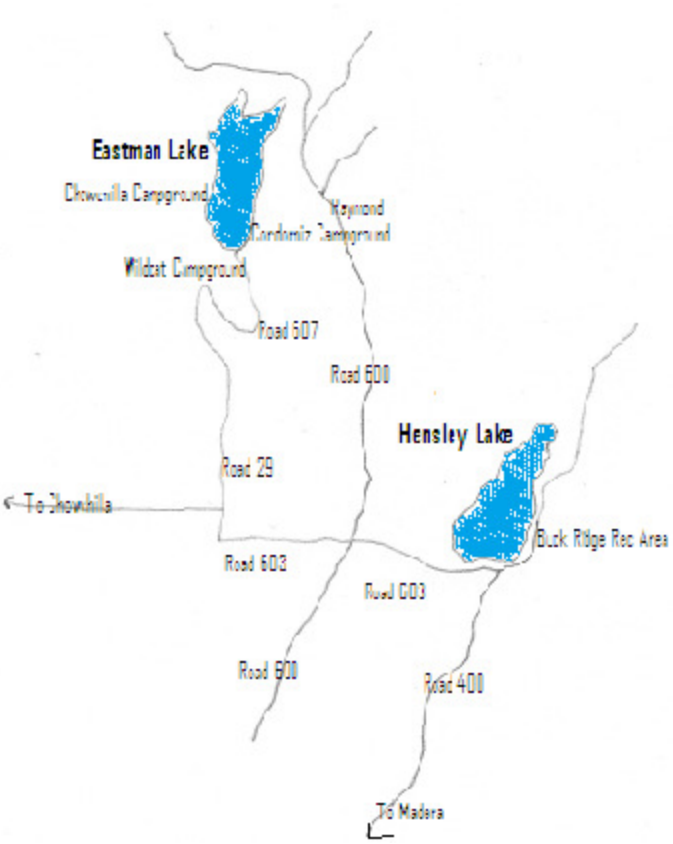
Mount Stromlo was originally called the Commonwealth Solar Observatory and was first used for upper atmosphere physics and solar studies. Its first telescopes were 30" and 50" reflectors, which have been used almost since the observatory's founding. In 1953. a 74" reflector was added, which for many years was the largest telescope in the southern hemisphere.

On the 1940s, the research emphasis was shifted to stellar studies, and shortly after World War II, the observatory was officially associated with the astronomy department at the National University in Canberra, which has managed it ever since. Also, with the growth of Canberra after the war, the quality of viewing deteriorated, and the university recognized the need for a more remote viewing site. In 1962, Siding Springs Mountain in northwestern New South Wales was chosen as a second viewing site, and three reflectors, 16", 24", and 40" were built there for astronomical research. Eventually a 90" reflector was added in the early 1980s. Today, the National Observatory still owns and runs the major telescopes at Siding Springs, buts several others have been added by other institutions.

In 2003, a wildfire destroyed many of the buildings at Mt. Stromlo, including five telescopes. They are currently being rebuilt. In addition, the Observatory is a partner in the building of the Giant Magellan Telescope, which will be based at Las Campanas in the Andes.

Mt. Stromlo still remains an important center for research into the southern skies, and has made important discoveries concerning the Magellenic Clouds, variable and double stars, globular clusters, and supernovas. It is one of the most important astronomical research facilities in the southern hemisphere, and will probably remain so for many years to come.

Sources: Wikipedia, "Mt. Stromlo Observatory"
International Encyclopedia of Astronomy, "Mt. Stromlo"



To Hensley and Eastman Lakes-Star party sites. The Eastman Lake starwatching site is at the boat ramp at the end of Road 29, just past the Cardinez campground.

The remains of the 50" telescope at Mt. Stromlo