DIABLO MOUNTAIN ASTRONOMICAL SOCIETY

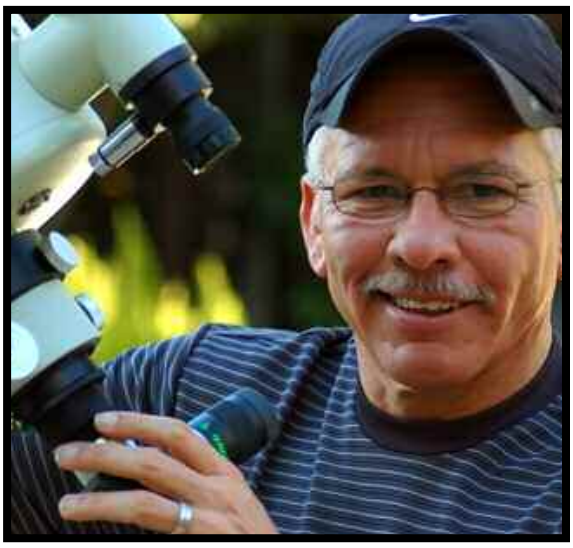
Remotely Accessible Observatory

By R Jay GaBany

August 28, 2007 — **Doors open at 6:45 p.m.**

Concord Police Association Facility 5060 Avila Road, Concord

Join us on August 28th when R Jay GaBany, amateur astronomer and frequent contributor to NASA's Astronomy Picture of the Day, will discuss his remotely accessible observatory located high in the South Central mountains of New Mexico.



The technology of the Internet has provided amateur astronomers with unprecedented opportunities to observe and photograph from dark sky sites. . . right in the comfort of their own living rooms. In years past, before the advent of extensive city lighting systems and air pollution, all the Earth's people could enjoy the unobstructed grandeur of the night sky. Telescope observing could be done almost anywhere.

By the mid-1800's, most of the world's greatest telescopes were housed at facilities in the middle of major cities but their effectiveness was rapidly diminishing due to the soot and light of urbanization. So, when the trustees of what would become Lick Observatory selected a site for their plans to house the world's largest refracting telescope, they *(continued on page 3)*

Upcoming Programs:

September 25: Vic Maris owner of StellarVue Telescopes.
October 23: MDAS 50th Anniversary Celebration and Dinner.

Jupiter

By Pam Cowart

Photo by Jim Scala

Gazing into the heavens on a warm summer evening (well, occasionally, we have warm evenings in Alameda), my eye is almost immediately drawn to a bright shining point of light rising in the eastern sky.

How far?

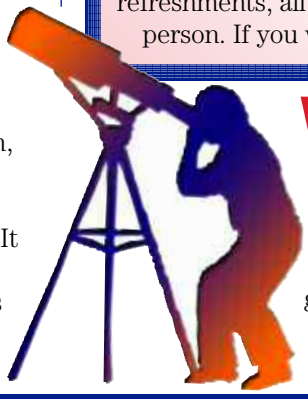
Located about a billion miles from the Sun, the Romans named it after their ruling god, Jupiter. In many respects, it seems to me that the planet Jupiter "rules" in our solar system. It is our solar system's largest planet—almost 1000 Earths would fit within its sphere and its mass is more than twice the mass of all the celestial bodies in our solar *(continued on page 3)*

Come & Celebrate

MDAS 50TH DINNER CELEBRATION

MDAS will be having a dinner celebration on October 23rd, at our regular general meeting.

Dinner will be served from 6:00pm to 7:00pm that evening, followed by our regular program. Dinner includes steak, chicken, potatoes, vegetables, desert and refreshments, all for only $10.00 per person. If you wish to *(continued on page 3)*



What's Up

By Richard Ozer

Most of our astronomical observing involves chasing down bright clusters, galaxies, planets, and other gems. Their emitted or reflected *(continued on page 3)*

President's Corner

Perseids & Myths

By Nick Tsakoyias

August is a wonderful month for stargazing especially if you enjoy meteor showers. Meteor showers are generated by sand-sized silicate particles left behind by comets.

Earth intersects the debris fields at specific points along its path about the sun. Therefore, meteors associated with showers radiate from particular spots in the sky. Showers are named after the constellation from which the meteors appear to originate. The Perseids have been around for a thousand years and appear to originate from the constellation of Perseus, its peak activity will be on Saturday August 11th, which also happens to be our society night.

The myth of Perseus is one of my favorites. It is one of adventure, betrayal, and lust, one that revolves around a proverbial victim of circumstances and an alert opportunist. Perseus was the son of the comely mortal Danae and the Greek god Zeus (hence the name Per Zeus, "fathered by" or "being of "Zeus.) Andromeda the beautiful princess of Ethiopia, was the daughter of King Cepheus and Queen Cassiopeia. Perseus and Andromeda owe their meeting to Cassiopeia, who had a very small problem: she was extremely vain! Cassiopeia would love to say over and over again that her daughter was more beautiful than the Nerieds, who were the sea's most beautiful nymphs. Hearing this, the Nerieds felt quite insulted and complained to their father Poseidon, god of the seas. Poseidon became very angry at hearing this insult. To punish the queen, he sent a flood and the sea monster Cetus to drown and devour the people of Ethiopia. As this was going on, Cepheus consulted the Oracle of Ammon. To his horror, the oracle told him that for the destruction to stop against his people he would have to sacrifice Andromeda his only daughter to Cetus the sea monster! Ancient Greek gods always seemed to dispense punishments that were far worse than the initial offence in order for the offender to properly atone for their original wrong doing. With great reluctance the king gave in to the prophesy.

Stripped naked, bound by the arms and waist to a coastal rock, poor Andromeda awaited her fate. But at that moment when all seemed lost the handsome and youthful Perseus flew down to her on winged sandals. At first he thought she was a statue for her pure white form seemed like that of marble, except that he noticed her golden hair blowing in the gentle breeze, and her bright eyes swelling with tears.

"O virgin, undeserving of those chains, but rather of such as bind fond lovers together," Perseus said, tell me, I beseech you, your name and the name of your country and why you are thus bound."

Perseus listened to Andromeda's woeful story, his blood boiled. Perseus was already feeling quite the hero, because he had just slain the gorgon Medusa, whose gruesome stare would turn you to stone if you gazed upon her. He had cut off her head and placed it in a leather sack and brought it with him as a trophy. Perseus whispered some words of hope to Andromeda. He offered to slay the beast if she agreed to be his bride. Andromeda agreed and sealed it with a kiss. Perseus told her at his signal to cover her eyes when the monster approached her. When the monster approached her Perseus held the blood-frozen head of Medusa before the monster and turned it to stone. As Greek myths go this one has a rare happy ending: Preseus slays the gorgon and the sea monster, and the beautiful Andromeda becomes his bride. They also become the great grandparents of another hero- the mighty Hercules.

I sincerely hope you enjoyed the story of Perseus, and will observe the Perseids shower on Saturday August the 11th.

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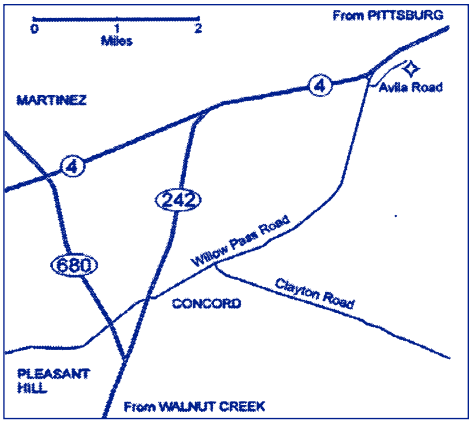

MDAS meetings are held on the fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversation are at 6:45 p.m. What's Up? at 7:15 p.m. Speaker at 8:00 p.m. The Concord Police Association Facility at 5060 Avila Road is at the top of the hill east of Willow Pass Road, just south of Highway 4. Everyone is invited.

Please consider receiving *the Diablo Moonwatch* by email instead of the Postal Service. Saving in printing and postage is more than $5.00 per member. You will receive your issue sooner, view it in color, and if you wish can be printed as well on your own printer. Please send a request by email to inquiries@mdas.net.

Remote Observatory

continued from page 1

decided upon a remote location on top of Mt. Hamilton. This was the first time an observatory location was selected based on the need for dark skies and steady seeing.

Increasingly, amateur astronomers in the 21st Century are following in their footsteps by also opening observatories in far off, dark-sky locations. But now, traveling to these remote sites is no longer required.

Mr. GaBany's New Mexico telescope is controlled from his home in San Jose using the Internet. He will present a demonstration of its operation, share some recent images that he has produced from New Mexico and give an update on the work he is doing with professional astronomers at the Astrophysical Institute of the Canary Islands, in Tenerife.

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Come & Celebrate

only $10.00 per person. If you wish to attend, you can make reservations either by calling Nick at (925) 681-2511 or emailing me at claytonjandl@aol.com. Be sure to give your full name and how many will be attending, you can pay on the night of the event. RSVP no later than October 16th. Bring your family and friends and help celebrate MDAS' 50th, anniversary!

Jupiter

continued from page 1

system combined. In fact, it is theorized that it is about as big as a planet of its type can get without gravitational contraction causing it to shrink. Yet for all its great size, it has the fastest rotation of all the planets, with a "day" on Jupiter being approximately 10 hours long. It has the most moons orbiting it, with a total of 63 at last count; it is the 3rd brightest object in the night sky, rivaled only by our Moon and Venus. It has some of the strongest winds of any of the planets. When looking at Jupiter through a telescope, we see alternating dark bands, called belts, and light bands, called zones. These bands are clouds and gases blowing in opposing directions, reaching speeds of up to 360 km/h. Consisting of approximately 90% hydrogen and 10% helium, with trace elements of methane, water, ammonia and rock, Jupiter's composition closely represents the primordial composition of the Solar Nebula that formed our solar system. Thanks to the information sent back by the Galileo probe launched in 1995, scientists have determined that the extreme turbulence in Jupiter's atmosphere is the result of Jupiter's high internal heat, not the results of solar effects such as is found on Earth. Because of this high internal heat, the hydrogen's molecular structure breaks down and transforms into metallic form encircling the rocky core of the planet, phasing into a liquid form as you move closer to the planet's surface. Scientists believe this metallic hydrogen serves as the electrical conductor that creates Jupiter's strong magnetosphere, which actually extends out to Saturn's orbit on the lee side of the planet.

And then there are the four large Galilean moons.

Calisto, the farthest out.

It is the most heavily cratered satellite in our solar system. Its icy surface is believed to be the result of holes punctured in its crust by meteorites which allowed water to overflow from below onto its surface and freeze. It lacks any large mountains—its main features are impact craters and their associated concentric rings.

Photo from Jim Scala – May 4, 2004 !0:00 PM PDT

Moving towards Jupiter, we next come to Ganymede.

The largest moon in our solar system. Bigger than Mercury or Pluto, if Ganymede orbited the Sun rather than Jupiter, it would be considered a planet. It is large enough to even have a thin oxygen atmosphere—but you would really have to bundle up, as the daytime temperatures range from -271 deg. F to -171 deg. F.

Europa.

Proceeding on towards the planet, we next come upon one of the most exciting celestial objects of our solar system—Europa, which has the smoothest, brightest surface in our solar system. Its smoothness is caused by a lack of craters, which suggests a young surface. It is thought that a liquid water ocean might exist beneath the icy, fractured crust of Europa. Liquid water, along with heat created by tidal forces caused by Jupiter and the large moons, and organic compounds obtained from comets and meteorites, provide Europa with all the components necessary for life.

Finally, in an orbit closer to Jupiter than our Moon is to Earth, is Io.

Io is the most volcanic body in our solar system, with lava lakes, lava flows and giant calderas covering its landscape. The volcanic eruptions on Io are so large that their plumes can be viewed by the Hubble Space Telescope. It has mountains as high as 52,000 ft., and areas that reach a temperature 1/3 as hot as the Sun. It is only 1/3 the size of Earth, yet generates twice as much heat. It's believed that Io's extreme volcanic activity is due to the gravitational pull of giant Jupiter on one side and the two large moons Europa and Ganymede on the other, causing a strong tidal bulge. The material spewed out by Io's volcanoes are captured by Jupiters magnetic field (which encompasses all of it's moons), pulling it into it's atmosphere and causing auroras on Jupiters polar regions, just as we have on Earth.

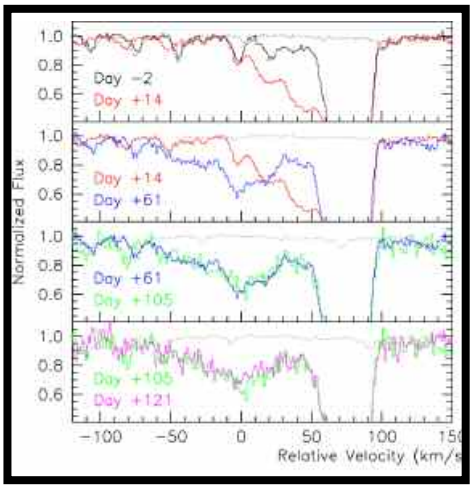
I'm not sure the Romans realized just how appropriate the name Jupiter was for our 5th planet from the Sun, but I think the name aptly describes our gas giant.

The Gobbling Dwarf that Exploded

ESO News

VLT Provides Evidence for Type Ia Supernovae Scenario

A unique set of observations, obtained with ESO's VLT, has allowed astronomers to find direct evidence for the material that surrounded a star before it exploded as a Type Ia supernova. This strongly supports the scenario in which the explosion occurred in a system where a white dwarf is fed by a red giant.



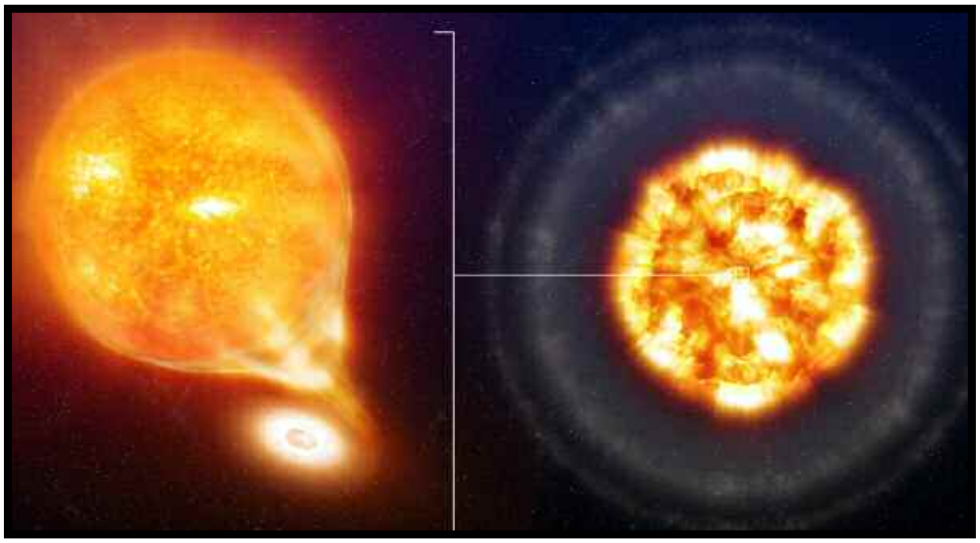
Evolution of the Sodium line in the spectrum of the supernova SN 2006X as a function of time since the supernova's maximum light in the blue. Four of the spectra were obtained with UVES on ESO's VLT and one with HIRES on the Keck. The spectra are shown with respect to a relative velocity and have been normalised to their continuum. In each panel, the dotted curve traces the atmospheric absorption spectrum.

Evolution of SN 2006X Spectrum

Because Type Ia supernovae are extremely luminous and quite similar to one another, these exploding events have been used extensively as cosmological reference beacons to trace the expansion of the Universe.

However, despite significant recent progress, the nature of the stars that explode and the physics that governs these powerful explosions have remained very poorly understood.

In the most widely accepted models of Type Ia supernovae the pre-explosion white dwarf star orbits another star. Due to the close interaction and the strong attraction produced by the very compact object, the companion star continuously loses mass, 'feeding' the white dwarf. When the mass of the white dwarf exceeds a critical value, it explodes.



Left: artist's impression of the favoured configuration for the progenitor system of SN2006X before the explosion. The White Dwarf (on the right) accretes material from the Red Giant star, which is losing gas in the form of stellar wind (the diffuse material surrounding the giant). Only part of the gas is accreted by the White Dwarf, through a so-called accretion disk which surrounds the compact star. The remaining gas escapes the system and eventually dissipates into the interstellar medium. The Red Giant star has a radius about 100 times larger than our Sun, while the White Dwarf is about 100 times smaller than the Sun.

Right: Once the mass of the White Dwarf has reached a critical limit, a thermonuclear explosion completely disrupts the star, ejecting its material with velocities up to a tenth of the speed of light. Twenty days after the explosion, when the supernova reaches its maximum brightness, the ejected material has reached a size of roughly 450 times the distance from Earth to the Sun. The enormous amount of light emitted by the supernova passes through the surrounding material before being detected by us, thus revealing gas shells which were ejected by the Red Giant in the last few hundred years before the explosion. These density enhancements were produced either by fluctuations in the mass-loss rate of the Red Giant, or by small recurrent explosive episodes on the surface of the White Dwarf in the final phases of its existence.

SN 2006X, before and after the Type Ia Supernova explosion

The team of astronomers studied in great detail SN 2006X, a Type Ia supernova that exploded 70 million light-years away from us, in the splendid spiral Galaxy Messier 100 (see ESO 08/06). Their observations led them to discover the signatures of matter lost by the normal star, some of which is transferred to the white dwarf.

The observations were made with the Ultraviolet and Visual Echelle Spectrograph (UVES), mounted at ESO's 8.2-m Very Large Telescope, on four different occasions, over a time span of four months. A fifth observation at a different time was secured with the Keck telescope in Hawaii. The astronomers also made use of radio data obtained with NRAO's Very Large Array as well as images extracted from the NASA/ESA Hubble Space Telescope archive.

"No Type Ia supernova has ever been observed at this level of detail for more than four months after the explosion," says Ferdinando Patat, lead author of the paper reporting the results in this week's issue of Science Express, the online version of the Science research journal. "Our data set is really unique."

The most remarkable findings are clear changes in the absorption of material, which has been ejected from the companion giant star. Such changes of interstellar material have never been observed before and demonstrate the effects a supernova explosion can have on its immediate environment. The astronomers deduce from the observa-

The Gobbling Dwarf that Exploded *continued from page 4*

tions the existence of several gaseous shells (or clumps) which are material ejected as stellar wind from the giant star in the recent past.

"The material we have uncovered probably lies in a series of shells having a radius of the order of 0.05 light-years, or roughly 3 000 times the distance between Earth and the Sun", explains Patat. "The material is moving with a velocity of 50 km/s, implying that the material would have been ejected some 50 years before the explosion."

Such a velocity is typical for the winds of red giants. The system that exploded was thus most likely composed of a white dwarf that acted as a giant 'vacuum cleaner', drawing gas off its red giant companion. In this case however, the cannibal act proved fatal for the white dwarf. This is the first time that clear and direct evidence for material surrounding the explosion has been found.

"One crucial issue is whether what we have seen in SN 2006X represents the rule or is rather an exceptional case," wonders Patat. "But given that this supernova has shown no optical, UV and radio peculiarity whatsoever, we conclude that what we have witnessed for this object is a common feature among normal SN Ia. Nevertheless, only future observations will give us answers to the many new questions these observations have posed to us."

A high resolution image of SN 2006X in the spiral galaxy Messier 100 is available as ESO Press Photo 08a/06.

More Information

These results are reported in a paper in Science Express published on 12 July 2007 ("Detection of circumstellar material in a normal Type Ia Supernova", by F. Patat et al.).

Supernova 2006X was discovered in M100, 12" west and 48" south of the nucleus, in the morning of February 7, 2006 by Shoji Suzuki and M. Migliardi of CROSS. At the time of discovery, it was of brightness 15.3 mag and still rising. Spectral analysis classified this one as a supernova of type Ia, discovered well before it reached its maximum. The maximum occurred on February 27, 2006 when its brightness had reached mag 13.5.

The team is composed of F. Patat and L. Pasquini (ESO), P. Chandra and R. Chevalier (University of Virginia, USA), S. Justham, Ph. Podsiadlowski , and C. Wolf (University of Oxford, UK), A. Gal-Yam and J.D. Simon (California Institute of Technology, Pasadena, USA), I.A. Crawford (Birkbeck College London, UK), P.A. Mazzali, W. Hillebrandt, and N. Elias-Rosa (Max-Planck-Institute for Astrophysics, Garching, Germany), A.W.A. Pauldrach (Ludwig-Maximilians University, Munich, Germany), K. Nomoto (University of Tokyo, Japan), S. Benetti, E. Cappellaro, A. Renzini , F. Sabbadin, and M. Turatto (INAF-Osservatorio Astronomico, Padova, Italy), D.C. Leonard (San Diego State University, USA), and A. Pastorello (Queen's University Belfast, UK). P.A. Mazzali is also associated with INAF/Trieste, Italy.

Note

During Type Ia supernova events, remnants of stars with an initial mass of up to a few times that of the Sun (so-called "white dwarf stars") explode, leaving nothing behind but a rapidly expanding cloud of "stardust". Their peak brightness rivals that of their parent galaxy, hence qualifying them as prime cosmic yardsticks. Type Ia supernovae are apparently quite similar to one another. This provides them a very useful role as 'standard candles' that can be used to measure cosmic distances. Astronomers have exploited this fortunate circumstance to study the expansion history of our Universe, leading to the conclusion that the Universe is expanding at an accelerating rate (see e.g. ESO PR 21/98).

White dwarfs are Earth-size, hot and extremely dense stars that represent the end products of the evolution of solar-like stars. During most of their life, such stars draw most of their energy from the transformation of hydrogen into helium. But at some moment, the hydrogen fuel will run out: this phase - still many billions of years into the future for the Sun - signals the beginning of profound, increasingly rapid changes in the star which will ultimately lead to its death. The star dramatically increases in radius, becoming a red giant. Later, it will expel huge quantities of gas and appear as a planetary nebula. After the planetary nebula has dissipated into interstellar space, the star left behind is a white dwarf.

2007 Public Program

Month	Date	Month	Date
August	18	September	15
		October	13

2007 Society Nights

Month	Date	Month	Date
August	11	November	3
September	8	November	10
October	20	December	1
		December	8

Membership Demographic Adjustment Section.

To all members: If you have any questions or comments regarding your membership status, badges, addresses, and/or magazine subscriptions, please contact Tom Harris through www.mdas.net and/or email: memberinfo@mdas.net. *Thank you!*

IMPORTANT REMINDER Just a reminder to all MDAS members, when driving up or down Mt. Diablo State park for a Public Astronomy Event or a Society Night please obey the speed limit on the mountain which is 25 MPH. Not only will you get a speeding ticket if caught by the rangers it is also unsafe to exceed that limit, being that the mountain has a very winding road and exceeding that speed may cause a serious accident to yourself and others including wildlife. Thank you, Nicholas Tsakoyias, MDAS President

Solar System Notebook

The Solar System Starts Showing Off

By Jim Scala

During winter and late spring this year Saturn, the Moon and Venus were the only solar system objects that beckoned solar system observers; especially with Jupiter, the amateur's planet, at low (-25°)declination. However, all that's starting to change as Venus pulls alongside and passes Earth on August 18th, Mars grows larger and the spectacular Lunar eclipse that begins on August 27th. The sun is slowly emerging from its current sunspot minimum so the casual solar observer can monitor changes; the more serious owner of solar H-· filter equipment can enjoy a constantly changing spectacle.

1

August Full Moon 2006. Colonial Americans named the August Moon according to their main activities; hence, it was called the Dog's Day Moon, Woodcutter's Moon, Sturgeon Moon, Green Corn Moon, Grain Moon and the Wort Moon depending on location and what was most important to them at the time.

A spectacular lunar eclipse starts on August 27th.

Although the eclipse is scheduled for August 28th in Universal Time, it begins 11:39PM PDT on August 27th for us in California and enters full eclipse at 0237 on August 28th. This should be a spectacular eclipse. The Moon will enter the Earth's shadow slightly off center so the lunar north will be in deep shadow and the south will be in a less dense shadow. That means the red colored moon in deep eclipse (called blood on the Moon) will not be uniform and should be quite striking. Although summer moons are usually low in the sky, the Moon's declination will be -11° which means comfortable viewing from a lawn chair with small telescopes and binoculars.

At our July monthly meeting MDAS member and author of the proclaimed Atlas of the Lunar Terminator, Dr. John Westfall, explained amateur projects that contribute to our wealth of knowledge, such as timing of crater disappearances and other projects. If you are interested in following up, the internet has many projects listed.

Venus grows to a strikingly beautiful crescent as it comes alongside Earth.

It's still possible to observe Venus as a bright star low in the western sky at sunset. If you do, you'll be treated to a beautiful crescent that's almost a full arc minute in its longitudinal (longest) dimension. Image two was taken on July 27th when Venus was an easy 48" crescent in my 7X50 binoculars. As August 18th nears when Venus passes Earth, it will become impossible to observe Venus in the evening sky and daytime viewing is generally necessary albeit difficult. Since Venus passes 8° south of the sun, this inferior conjunction is easy, but care must still be taken so you don't inadvertently bring the sun into your field of view.

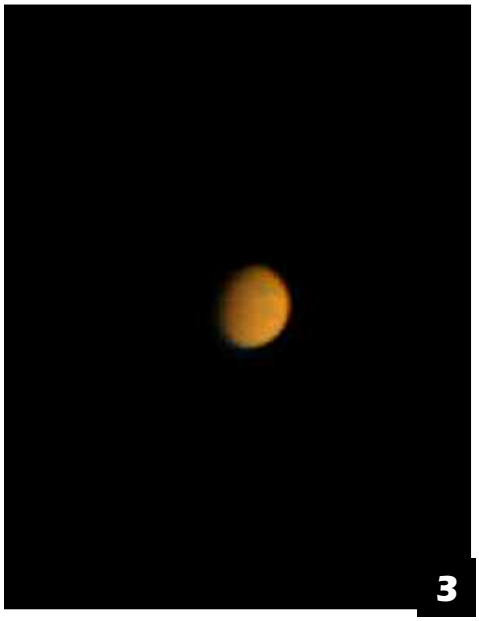
2

Venus on July 27th, 2007; FOV is 1' X 1'. A challenge during the next two weeks is to position yourself with a long lens (200-mm to 300-mm) so that you can capture Venus' slender, but large crescent just below the Golden Gate Bridge.

The Solar Notebook *continued from page 6*

Early risers can step up to the Mars' challenge.

By August 15th Mars rises just after midnight, so it's well up in the sky at sunrise. At 20° declination, Mars is well placed for high-power observation. On July 14th I observed Mars at 375X in a clear steady morning sky and could easily see considerable detail on its 6.3"disk. Image three taken on July 15th illustrates how small the Martian disk is at this early stage in its march to opposition on December 24th. Image three's field of view is one minute of arc; the same as image two. When at its closest on December 19th, Mars disk will be just a little over 15" and will take about 1/4th the FOV.



Mars on July 15th showing its diminutive 6.3"disk (FOV is 1'X 1') just before sunrise. Mars disk will be 8" by August 15th showing considerable detail.

The Sun begins a slow march to sunspot maximum.

Old sol is the easiest of all solar system objects to observe and only during the depth of sunspot minimums, it doesn't show striking activity from day to day. The sun is emerging from the recent minimum that reached its depth by June of this year. Predicting sunspot maximums and minimums is not an exact science, so you'll find predictions for the next maximum ranging from spectacular to so-so. No matter who's correct, the maximum of about 2010 should be excellent for observers. Image four shows a sunspot group on July 13th that was easily seen with a small telescope.

The Sun on July 13, 2007 showing a sunspot group almost centered on the disk. The large central spot was over 45", making it about three times the size of the planet Earth. This marks the very beginning of the next sunspot maximum.

AANC Conference 2007: Reach for the Stars

September 29, 2007 — College of San Mateo — 1700 West Hillsdale Boulevard, San Mateo CA

Join us for a fun-filled day and night of astronomy events.

From workshops, talks and telescopes to raffles and kid's activities, there are stellar treats for everyone!

Astronomy clubs from all over northern California are bringing their enthusiasm, know-how and telescopes to share with the public. Equipment vendors will demonstrate the latest astronomy products to everyone, including people seeking to get started in astronomy.

Planetarium shows, updates from NASA scientists, hands-on astronomy activities for all ages, a raffle of great astronomy gear, telescope making, solar telescopes, and finishing the night off… "Jazz Under the Stars" Star Party hosted by the San Mateo County Astronomical Society and KCSM from 7:45 until midnight.

The "Reach for the Stars" conference is sponsored by the following organizations:

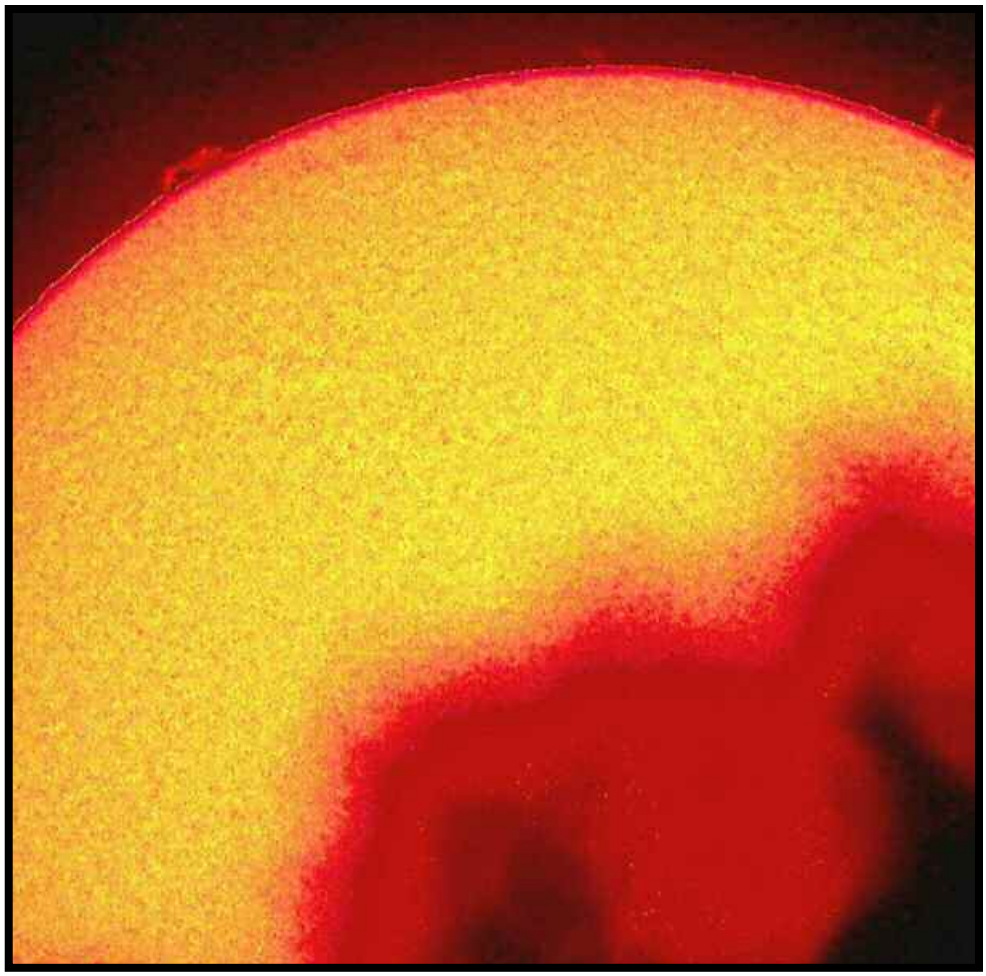
The Astronomical Association of Northern California
The Astronomy Department of the College of San Mateo
The San Mateo County Astronomical Society

What's Up *continued from page 1*

light are often visible in even the most light polluted environments. There's a "dark side" to observing as well (and I don't mean astro-photography). Barnard objects are dark clouds of gas, most notably observed against the background of the summer milky way. Join me for a tour of the most notable Barnard objects while there's still some summer time left.

From Mike Harms

I snapped this photo of the sun setting behind the nearby trees while attending our 50th anniversary celebration atop Mt. Diablo. The image was taken using one of the Hydrogen-Alpha solar telescopes that was set up for public viewing. Many prominences are visible along the sun's limb as well as detail on the disk itself. The image was acquired by holding a regular digital camera up to the eyepiece and pushing the button. It's amazing what technological advances have brought us in the last few years! Could we have even imagined 50 years ago that we would be doing this kind of stuff today?



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