

Searching for the origin of space storms

March 25th, 2008

Doors open at 6:45 p.m.

Concord Police Association Facility 5060 Avila Road, Concord

Spectacular auroras and the periodic disruption of spacecraft and communications systems are how we on Earth are affected by storms in space.



Join us on Tuesday, March 25th when Dr. Vassilis Angelopoulos of UCLA speaks with us about how NASA is trying to determine when and where space storms originate to enable researchers to better predict space weather. Dr. Angelopoulos is the principal researcher for NASA's THEMIS mission which made news in December by revealing new insights into the forces that cause auroras. "We're coming up on a new era in space physics," *(continued on page 5)*

Upcoming Programs:

- April 22:** Ryan Wyatt, California Academy of Sciences, Plans for the new Morrison Planetarium.
- May 27:** Jeff Adkins & the Deer Valley High School Students Astronomy Research Projects.

Outreach Update

By Jim Head

At the January general meeting we handed out five "2008 NASA NightSky Network Star" awards to congratulate those who demonstrated and participated in 3 events using NightSky network activities. The recipients were Marni Berendsen, Liede-Marie Haitsma, LeRoy Wiens, Mike Harms, and Jim Head. But there were many other stars who help often at our private starparties for schools and other groups. I'd like to thank these outstanding volunteers

for contributing their time and effort: Lance Schlichter, Leary Wong, Mike Harms, Robert Cowart, Pam Cowart, Steve Jacobs, Linda Jacobs, Vianney Serriere, Ken Coates, Liede-Marie Haitsma, Marni Berendsen, Doug Grebe, and Chris Ford.

Marni and other members tested the newest toolkit for the NASA NightSky *(continued on page 3)*



What's Up

by Liede-Marie Haitsma

**No Scope. . .
No Problem"**

If you don't have a telescope to view the universe there are other ways to view the stars, planets, etc; the use of binoculars and the SunSpotter.

President's Corner

Galileo's Daughter

By Nick Tsakoyias

As winter slowly turns into spring, I look at my observing log and it's basically empty.

Rain, cold, and bad seeing have preventing me in any sort of observing, except for one night in February where I was able to view the lunar eclipse and what a sight it was!

In the mean time I look at my reading log of books that I have read in the winter months and it's full of notes from those books. One such book is



Suor Maria Celeste

"Galileo's Daughter" written by Dava Sobel.

According to Ms. Sobel she had a life long fascination with Galileo and by the surviving letters that Galileo's daughter had written him. That daughter was born on August 13th 1600 the same year that Giordano Bruno was burned at the stake in Rome for insisting that the Earth revolved around the Sun instead of the Sun revolving around the Earth. Galileo christened his daughter Virginia after his cherished sister who he adored. Galileo

never married Marina Gamba of Venice who was the mother of his three illegitimate children, the eldest being Virginia, a second daughter named Livia, and the youngest being Vincenzo. Galileo loved his three children very much and would do what he could to make sure they would be taken care of.

Unfortunately back then for women if you were born illegitimate you would never be able to marry a proper husband who could provide for you, it had a certain stigma attached to it, men on the other hand had a much easier time of it as long as they could be good



Galileo

providers. In 1613 Galileo decided that the best thing he could do for his daughters was to place them in the Convent of San Matteo in the town of Arcetri, near Florence to become Nuns, and in 1614 Virginia and Livia assumed their religious habits. In 1616 Virginia professes her vows as Suor Maria Celeste, and in 1617 Livia professes her vows as Suor Arcangela.

It was with Suor Maria Celeste that Galileo for the next 18 years when not visiting her and her sister at the convent would correspond through an exchange of letters. These letters bring out a very intimate portrait of their relationship. Suor Maria Celeste was his staunches supporter who helped him through his darkest times with words of encouragement, love, and support. Ms. Sobel has done a remarkable job of translating her letters to him (none of his letters to her have survived) while at the same time unveiling Galileo's story through her letters. The story of Galileo is one scientific triumph and brilliance, but like a Greek tragedy it has those who were jealous and were looking to destroy him, by using the political climate of the Roman Catholic

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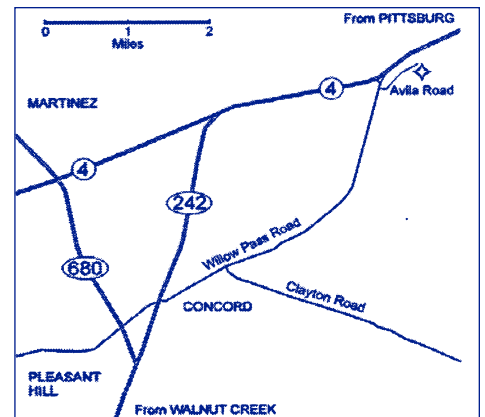
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MDAS meetings are held on the fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversation are at 6:45 p.m. What's Up? at 7:15 p.m. Speaker at 8:00 p.m. The Concord Police Association Facility at 5060 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.

Church of that time.

MS. Sobel moves between Maria Celeste's sequestered life and Galileo's public life through these letters, reveal-

continued on page 3

President's Corner *continued from page 2*

ing the social and political climate of Italy at that time, a time when humanity's perception of the cosmos was being challenged and turned upside down. I leave you with one of Suor Maria Celeste's letters to her father from the book.

"Most Illustrious Lord Father,

We are terribly sadden by the death of your cherished sister; our dear aunt; but our sorrow at losing her is as nothing compared to our concern for your sake, because your suffering will be all the greater, Sire, as truly you have no one else left in your world, now that she, who could not have been more precious to you, has departed, and therefore we can only imagine how you sustain the severity of such a sudden and completely unexpected blow. And while I tell you that we share deeply in your grief, you would do well to draw even greater comfort from contemplating the general state of human misery, since we are all of us on Earth like strangers and wayfarers, who soon will be bound for our true homeland in Heaven, where there is perfect happiness, and where we must hope that your sister's blessed soul has already gone. Thus, for the love of God, we pray you, Sire, to be consoled and to put yourself in His hands, for, as you know so well, that is what He wants of you; to do otherwise would be to injure yourself and hurt us, too, because we lament grievously when we hear that you are burdened and troubled, as we have no other source of goodness in this world but you.

I will say no more, except that with all our hearts we fervently pray the lord to comfort you and be with you always, and we greet you dearly with our ardent love.

From San Matteo, the 10th day of May 1623.

*Most affectionate daughter,
S. Maria Celeste"*

Outreach Update *continued from page 1*

Network program -- entitled "SUPER-NOVA!" at an outreach Workshop on Jan 15th. It has interesting activities that explain such things as what made us, and how our atmosphere protects us from high energy particles. The kit should be available in March. Soon there will be seven toolkits that help members demonstrate easy to teach and learn activities for the public during our starparties, or in classrooms. Leary Wong and Jeff Adkins signed up to manage two of the toolkits -- "Telescopes - Eye's on the Universe" and "Black Hole Survival".

Our next workshop is March 18th, and we'll be showing off the Solar System Exploration toolkit (see other article for details.) Please let us know if you are interested in learning more about this successful and astronomy-club-tested program.

Thanks to Jon Wilson and Lance Schlichter for helping at Country Club Elementary in San Ramon Jan 30th - we had a break in the clouds and seeing was pretty good! About 100 parents and kids looked through our scopes as part of their Math and Science Night. The kids loved the infant stars in the Orion Nebula.

Thanks to Marni for helping with Parkmead's Elementary Science fair on Jan 31st! An amazing science guy entertained us and we demonstrated the newest toolkit afterwards.

And what a great Lunar eclipse Feb 20th! We had four events in Contra Costa County - Jeff Adkins held a Black Hole Workshop and telescope viewing at Deer Valley High School in Antioch, Ken Coates and Chris Ford worked with students at Rheem Elementary in Moraga, giving a presentation -- including the story of how Columbus used his knowledge to predict an upcoming lunar eclipse that saved him and his crew. Marni, Lance Schlichter, Vianney Serriere, Linda and Steve Jacobs, Harold Housley, and Mike Harms were at Buena

Vista Elementary in Walnut Creek, and Leary Wong and I were at Pleasant Hill Elementary. All together we showed the eclipse to over 500 folks!

Helping at starparties can be very rewarding. The gratitude of folks who never would otherwise have a chance of looking through a telescope is very rewarding. Even Binoculars are great -- or if you don't have a telescope I'll lend you one for the evening! This is a great learning opportunity too.

Mark your Calendars!

Schedule for 2008 Spring Starparties:

We always are in need of telescopes for these rewarding events:

Apr 9: Westwood Elementary, Concord

May 17: Muir Heritage Land Trust
Fernandez Ranch, Martinez

May 29: Diablo View Middle School, Clayton

June 10: Richmond Elementary, Richmond

2008 Public Program

Month	Date	Moon Phase
April	26	Last Quarter (28)
May	10	First Quarter (12)
June	7	First Quarter (10)
July	5	New Moon (3)
August	2	New Moon (1)
September	6	First Quarter (7)
October	4	First Quarter (7)

2008 Society Nights

Month	Date	Moon Phase
April	5	New Moon (6)
May	3	New Moon (5)
June	28	Last Quarter (26)
July	26	Last Quarter (25)
August	12	Special Permission Perseid Meteor Shower
August	30	New Moon
September	27	New Moon (29)
October	25	New Moon (28)
November	1	New Moon (Oct. 28)
November	29	New Moon (27)
December	20	Last Quarter (19)
December	27	New Moon

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

Visiting Tahiti's Point Venus: A Retrosopic Look at Cook's Transit Expedition

By Jim Scala



A Lighthouse (now automated) marks the place where Captain Cook established his transit observatory on Tahiti in 1769.

Surf at Point Venus is probably the same today as on June 3, 1769 when Captain Cook observed the Transit of Venus. He left Plymouth, England on August 12, 1768 and charted a course for an island only 20 miles across that had only been discovered a year earlier. Cook would have to steer across thousands of miles of mostly uncharted Open Ocean without even a good clock to keep time for navigation. Remarkably, he and his 94 man compliment arrived almost two months before the transit. Regular servings of sauerkraut prevented scurvy on the Endeavour which before then had often reduced crews by half.

The solar system's size was unknown to 18th century science like dark energy is today. In 1768 only six planets orbited the sun and although the relative was known; for example Jupiter was 5 times farther from the Sun than Earth, the absolute distances were unknown. In 1716 Edmund Halley realized that Venus could be the solution

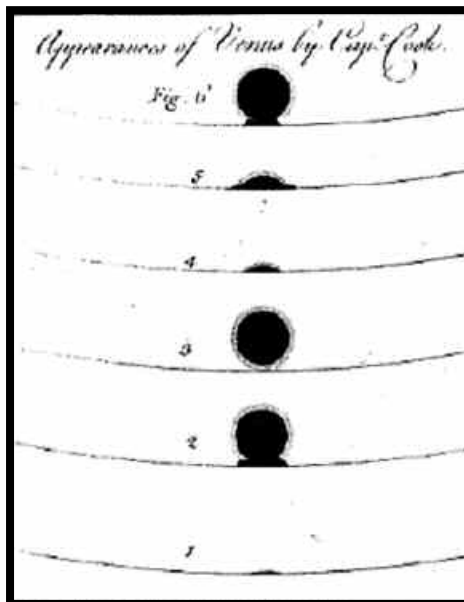
because seen from Earth, Venus occasionally crosses the face of the Sun. Then, by noting the start- and stop-times of the transit from appropriately spaced locations on Earth astronomers

If something can go wrong it will!

Intense sunlight filtering through Venus' atmosphere fuzzed the disk's edge and decreased the precision with



using parallax could calculate Venus's distance. With that distance in hand the entire solar system would follow. Unfortunately, Halley couldn't have predicted the unexpected challenge Venus transits posed.



Drawings by Captain Cook showing the contact between Venus and the Sun's disk. Cook's drawings illustrate what has become known as the Black Drop.

Viewing Tahiti standing on Point Venus exactly where Captain Cook recorded the Transit of Venus on June 3, 1769. The island appears much as it did then. A major scientific expedition in its day.

which contact between the Sun's disk and Venus's disk could be timed. Hence the ship's astronomer Charles Green, who observed the transit alongside Cook, differed by 42 seconds. Similar differences were observed among the 75 measurements that were made from other sites. No matter how the data were manipulated, it simply couldn't yield the precision necessary for the solar distance calculations. Image three is Cook's drawings of the Venus: Sun contact showing the effect that became known as the "black drop" and the uncertainty it caused.

What is the Black Drop?

Hold your thumb and forefinger up to a bright sky and slowly bring them together while looking through the place where they'll meet. Notice how diffraction makes their precise position uncertain and although you can feel when they touch, actually seeing it precisely

Solar System Notebook *continued from page 4*

isn't possible. Halley nor scientists of the time could have foreseen that effect; it's one of those things that happen in scientific research and scientists would have to wait more than a century than a for the next transit. Image four shows the Black Drop of the recent transit as observed by me from Spain using an excellent three inch refractor.

Cooks Expedition in retrospect teaches a good lesson.

When the Endeavour weighed anchor and left England for Tahiti it was similar to us sending an expedition to

Mars so scientists could observe a transit of earth.

That analogy is supported by modern GDPs, time commitments and other factors support; even though there'd be fewer unknowns today. The unforeseen Black Drop effect also has an analogy in modern science. Consider that scientists set out to quantify the universe's rate of



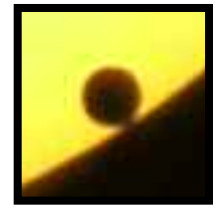
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expansion of the universe and discovered its expansion is accelerating. And now we are trying to understand the Dark Energy that causes the acceleration. It seems the lesson is that whenever we explore the unknown we must embrace the results and view the unexpected as an opportunity.

Searching for The Origin of Space Storms *continued from page 1*

said Dr. Angelopoulos.

Dr. Angelopoulos earned his B.S. in Physics at the Aristotle University of Thessaloniki,

Greece, in 1986. He then came to the US, to earn his Masters and his Ph.D. with a specialization in Space Plasma Physics at UCLA. After 2 years

at the Applied Physics Laboratory in Maryland, 7 years at the Space Sciences Laboratory, UC Berkeley and 5 years at the Jet Propulsion Laboratory, Angelopoulos joined the faculty of Earth and Space Sciences at UCLA in summer of 2007.

As stated by NASA, THEMIS, which stands for Time History of Events and Macroscale Interactions during Substorms, "aims to resolve one of the

oldest mysteries in space physics, namely to determine what physical process in near-Earth space initiates the violent eruptions of the aurora that occur during substorms in the Earth's magnetosphere."

THEMIS has just celebrated its first anniversary in space. Dr. Angelopoulos will tell us about that first year and maybe show us some of its baby pictures.

MDAS Astronomy Workshop, March 18th, 7:00 p.m.

Reserve your place to explore the Solar System

Amateur astronomers often provide a person with his or her first look through a telescope. Some of our favorite telescope targets to share with the public are the planets of our Solar System. The view of Saturn through the eyepiece can be a life altering experience.

Explore the Night Sky Network's Solar System ToolKit which provides us with tools to show the structure of our Solar System, including models for sizes and distances, to connect what is seen in the sky with where the planets are in relation to Earth.



Mark your calendars now for the second in our series of astronomy outreach workshops, which will be held the evening of Tuesday, March 18, 2008, 7:00 p.m.

Find out about – and maybe take home – some of the other ToolKits provided to our club by the NASA Night Sky Network (<http://nightsky.jpl.nasa.gov/>).

The location of the workshop is Marni Berendsen's home: 2466 Sky Road in Walnut Creek, 925-930-7431.

If you would like to reserve a place at the workshop, be notified of future astronomy workshop meetings, and/or get access to the NASA Night Sky Network website, email or call Jim Head, our MDAS outreach coordinator, and he'll send you more details: jamesnhead@comcast.net or 925-202-5345. As with our club's other Special Interest Groups, these workshops are offered free of charge for any MDAS member. New members through seasoned veterans have attended and you are invited to participate. No prior knowledge or experience is required.

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!

SETI Goes Full Time with the Allan Array; Old Questions Surface Again.

By Jim Scala

"It is the first major telescope in the world built specifically for undertaking a search for extraterrestrial intelligence," SETI Institute's Seth Shostack said on October 11, 2008 when 42, twenty foot diameter dishes of the Allan Array in Hat Creek, California started listening for alien signals. In three years, when all 350 dishes are listening, the array can search a million stars. SETI is the Allan Array's primary objective and galactic research is secondary; a reversal for SETI which until now has piggy backed on radio astronomy research which often allows the two objectives to go on simultaneously. Named after its benefactor, Microsoft cofounder Paul Allan, the Array renews interest in finding intelligent life in our galaxy. More important, it raises questions about the strategy to detect alien signals.

What's the basis of the SETI radio search?

SETI is based on the idea that when intelligent life achieves technology and is both curious and gregarious it will transmit radio signals saying "we're here and we want to hear from you." In short, SETI searchers believe that if they are technologically ahead and sentient albeit physically different they'll be transmitting. Using basic physics, deductive logic and faith in the concept, Frank Drake (SETI's acknowledged father) and others concluded alien societies would transmit in bands within a range called the "water hole" which includes bands sufficiently signal free that we could all have a galactic conversation. Due to the distances involved, once galactic conversation gets started it would take place in slow motion unless the advanced beings can tell us how to exceed light speed in sending information.

Don't confuse these "hello" signals with the usual TV and radio signals we transmit now because deliberately trans-



mitted and directed signals require high technology, major energy and time commitments. More a reply could take ten thousand years to be received by the sender, so a dedicated, almost certainly automated system is necessary. Only a mature, stable society socially advanced far beyond us could undertake a project that requires hundreds of human generations. Indeed, Frank Drake suggested that such beings would probably have achieved immortality compared to human life spans. It's likely they have developed artificial intelligence, robotic life and their entire project would be setup to robotically transmit and listen for tens of thousands of years.

What other search strategies are possible? Are they being pursued?

About 100 years ago, some scientists who believed Martians existed and might be watching earth, proposed building huge fires in the Sahara desert illustrating the Pythagorean Theorem to prove we're here and we're smart. Hence searches for light signals (now lasers), actual probes (Bracewell-Von Neumann self replicating probes) that aliens have sent are all possible approaches in addition to radio signals. However, only serious radio searches in both hemispheres are underway even though these other realistic search strategies can be followed once enough

scientists are interested and funds are available.

Can we calculate our chances of success?

If we don't listen chances are zero unless the aliens sent a signal we cannot miss, a probe that announces itself or a spaceship we can see. A society just a few hundred years advanced over us on our side of the galaxy would probably know there's a planet around our sun that harbors plant life and Earth's abundant smog implying there's serious technology

here. Would they send signals? If they start tomorrow and they're 300 light years away (close by astronomical standards), we'd have to be listening in 300 years. Will the Allan array be listening for 300 years from now? What if they're 1,000 years away? Perhaps we'll have an equivalent and larger Allan Array on the Moon or Mars in 300 years; we certainly will in 1,000 years if we haven't heard by then.

Suppose the alien society is one million years ahead (an eye blink in astro-time) which some scientists say is more likely. Certainly they would have known our solar system is the abode of life and by now they would have detected our technology. This possibility led Johann Von Neumann to conclude that a probe or other non-ignorable signal would probably have arrived, so Enrico Fermi's asked "Where are they?" In the 57 years since Fermi's question and after 40 years of listening albeit not very aggressively by Allan Array standards, we've heard and nothing. In fact SETI's silence has supported some scientists; most notably Frank Tipler to conclude we're alone in so far as highly technological societies is concerned.

Frank Drake's original equation designed to calculate how many technological societies are transmitting establishes the scientific basis for understanding our chances. The problem with this

is that all its factors are unknown; looking over the Drake Equation brings this point home as follows:

$$N = N^* fp ne fl fi fc fl$$

N*: How many stars in our galaxy? This is at times stated as 100 billion and other times as 300 billion. Let's split the differences and say 200 billion.

fp: How many solar type stars have rocky planets? A recent analysis puts planets around solar type stars (5% of stars) at 20 to 40%. Okay, how many are rocky? How do we create a meaningful number from that?

ne: How many planets can support life? We have one example; earth where life started quickly in astro-time. But we already know (Ward and Brownlee) our solar system is atypical among solar type stars, so is the factor 0.1 or 0.00001 or even less?

fl: On how many planets does life evolve? Is it 100% or is it 0.0001%?

fi: Of that, on how many does intelligent life evolve? Is it 100% or 0.0001%?

fi: How many will communicate by radio? Again, 100% or 0.0001%?

fl: How long will they communicate? Is it 10 years, 10,000 years or 100,000 years? How long will we listen? Do the long time commitments require a completely robotic program?

We can gain insight into the above by observing that nature used enormous numbers to get us here today. We see lots of stars, even more galaxies providing myriad chances for life. If only one intelligent life bearing planet emerges per galaxy there's an enormous amount of intelligent life in the universe with incredible potential. Once present, life also relies on huge numbers; for example calculate how many trout eggs and sperm are required to get just one more trout in a mountain stream one year and you'd realize percentages for success are very small. Does that kind of calculation apply here. Do the same large numbers with small percentages of success apply everywhere? We simply don't know and at this time must follow the axiom; if we don't try, we can't succeed! So, at this time it probably is somewhat a faith based investigation.

Are we expecting too much from an old method?

Some say that searching for radio signals is somewhat like looking for smoke signals when we've got telephones. People who raise this issue ask, "Would a society advanced at least 100 years, let alone one million years ahead use obsolete methods?" After all, we're rapidly developing quantum computer techniques that will surely influence communication techniques. Why would they communicate with simple radio waves if they have significantly better methods? SETI supporters have seriously considered this question and say aliens would have concluded that we'd start listening when our radio astronomy made it possible; hence the use of radio. And in their initial information package, they'd explain more advanced communication methods we could build and enter their discussion group. Isn't information exchange the objective of communication? Would interstellar communication be different? Once serious information exchange gets started, we're on our way.

Is the upside of success about exchanging information?

Couldn't we learn much from a technologically advanced society? Is all life based on DNA? If so how do we cure all human disease? If not, what other systems are possible and are they better? Can communication techniques exceed light speed? Myriad questions dealing with the physical and social sciences could be answered. Suppose they had become a partially robotic society or have developed silicon based life? Can people travel among the stars? If so, how? Just thinking of questions, suggests that once the novelty of knowing we're not alone wears off, information is SETI's practical outcome.

Social implications are mind boggling. If the advanced beings were dramatically physically different wouldn't it impose greater

respect for all life? Would religions face serious challenges? Wouldn't everyone face questions about the human differences we take so seriously? What if bionic people existed that could think at quantum computer speed? Could intelligent, independent robotic life outperform humans? Does robotic life experience consciousness? Indeed, the information exchange could have a social impact beyond anything we've ever faced. At the very least, science would enter a renaissance the likes of which have never been seen.

Is there a downside to SETI success?

Is there ever a serious downside to discovery? Is there a downside to knowledge? Will the advanced beings envision eight billion humans as a vast food supply like in Hollywood's movies? Paranoia is one of the most important survival traits that humans ever developed and it will kick in if there's a downside to SETI success.

If SETI succeeds one thing is certain.

Knowing we are not alone will be the greatest discovery in human history. Proving the negative might not be possible in human lifetime. In spite of anything the pundits on either side can say, our very nature compels us to listen and people like Paul Allan should be commended.

The search could take a long time. So, anyone who would like to have an answer can support SETI!

Frank Drake



GOLDEN STATE STAR PARTY

July 2 - 6, 2008

The Astronomy Connection (TAC) organizations of the San Francisco Bay Area, the Sacramento Area, and Southern California have officially announced The 2008 Golden State Star Party. This event will be held on four nights at their exciting new dark site near Aden, California from July 2 through July 6, 2008.

The GSSP has a long successful history that began with the first Lassen Star Party in 1994, followed by many years of first-rate star party events in Lassen and Shingletown venues. Over these years, the organizing committee has searched for the "perfect site" with ink black skies and no intrusive light domes, 360 degree horizons, minimal dust problems, and an area big enough to fully accommodate a large group of

avid astronomers and their gear. In 2007, this site was finally found in a ranch near Aden.

GSSP is one of the premier Star Parties in California, now featuring the darkest skies, plenty of room and accommodations for camping and RV's, on-site food services, showers, sanitary facilities, ice, and water. Off-site accommodations and services are also available in the nearby towns of Adin and Bieber. In addition to unparalleled stargazing at night, there are many daytime attractions and activities nearby as well. GSSP is 100% organized and run by astronomers for astronomers. At this new venue, and with the support of avid astronomers and the local community, GSSP promises to be an annual event

that will rival the top Star Parties in the country, including the Oregon and Texas Star Parties.

GSSP is intended for the pure enjoyment of all astronomers. Over the years, I have been to several of the TAC-sponsored Star Parties, and I have never been disappointed. I highly recommend this event to all the members of the Mount Diablo Astronomical Society.

Early Registration is now in full swing until April 15.

The all-inclusive registration fee is only \$45. For more information, visit the official GSSP website at <http://www.goldenstatestarparty.org> or contact info@goldenstatestarparty.org.

Richard Ozer

Diablo Moonwatch

March 2008

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