

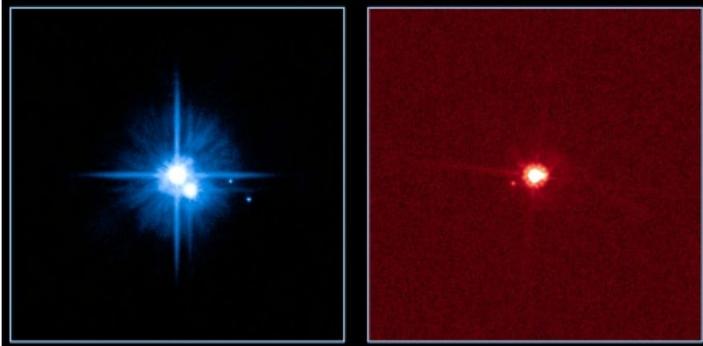
# Sonoma Skies

Newsletter of the Sonoma County Astronomical Society  
A nonprofit scientific and educational organization

July 2008

[www.sonomaskies.org](http://www.sonomaskies.org)

Volume XXXI No. 7



The image at left is of Pluto with its moons Charon, Hydra and Nix. At right is Eris and its moon Dysnomia.

## Plutoids

On June 11, the International Astronomical Union decided on the term plutoid as a name for dwarf planets like Pluto at a meeting of its Executive Committee in Oslo.

Almost two years after the International Astronomical Union (IAU) General Assembly introduced the category of dwarf planets, the IAU, as promised, has decided on a name for transneptunian dwarf planets similar to Pluto. The name plutoid was proposed by the members of the IAU Committee on Small Body Nomenclature (CSBN), accepted by the Board of Division III, by the IAU Working Group for Planetary System Nomenclature (WGPSN) and approved by the IAU Executive Committee at its recent meeting in Oslo, Norway.

Plutoids are celestial bodies in orbit around the Sun at a semimajor axis greater than that of Neptune that have sufficient mass for their self-gravity to overcome rigid body forces so that they assume a hydrostatic equilibrium (near-spherical) shape, and that have not cleared the neighbourhood around their orbit. Satellites of plutoids are not plutoids themselves, even if they are massive enough that their shape is dictated by self-gravity. The two known and named plutoids are Pluto and Eris. It is expected that more plutoids will be named as science progresses and new discoveries are made.

The dwarf planet Ceres is not a plutoid as it is located in the asteroid belt between Mars and Jupiter. Current scientific knowledge lends credence to the belief that Ceres is the only object of its kind. Therefore, a separate category of Ceres-like dwarf planets will not be proposed at this time.

The IAU has been responsible for naming planetary bodies and their satellites since the early 1900s. The IAU CSBN, who originally proposed the term plutoid, is responsible for naming small bodies (except satellites of the major planets) in the Solar

## Roving Mars

A Disney Imax DVD  
SCAS July 9 Meeting, 7:30 PM  
at Proctor Terrace School

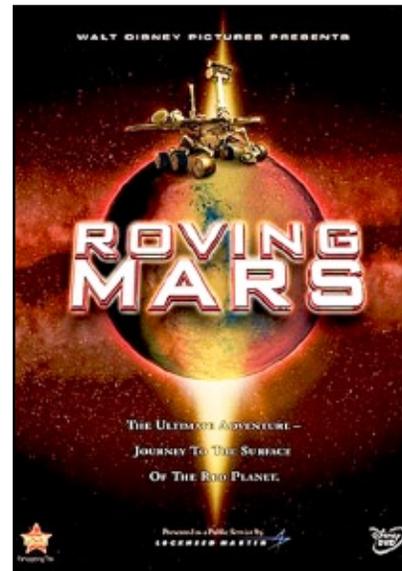
While we may be decades away from putting a human on Mars, this engrossing IMAX adventure produced by Academy Award-

winning filmmaker Frank Marshall offers a sneak peek at what it will be like when we do.

With director George Butler serving as your guide, you'll walk the rugged terrain of the red planet's surface via the panoramic eyes of Spirit and Opportunity, the twin robotic rovers sent into space in 2003."

Please join us to view this special screening. As always, the public is invited to attend.

Click below to see a preview:



<http://disney.go.com/disneyvideos/liveaction/rovingmars/>

System. The CSBN will be working with the IAU WGPSN to determine the names of new plutoids to ensure that no dwarf planet shares the name of another small Solar System body. The WGPSN oversees the assignment of names to surface features on bodies in the Solar System. These two committees have previously worked together to accept the names of dwarf planet Eris and its satellite Dysnomia.

The absolute magnitude H for planets, dwarf planets, comets and asteroids allows astronomers to compare the brightness of objects as if they all sat one astronomical unit from the Sun and the Earth and at a phase angle of zero degrees. In this scale, increasing brightness corresponds to a decreasing magnitude. Apparently bright objects can have negative magnitudes while positive magnitudes indicate dim objects.

Young Astronomers See page 6

# Sonoma County Astronomical Society (SCAS)

## Membership Information

**Meetings:** 7:30 PM on the second Wednesday of each month, in the Multipurpose Room of Proctor Terrace Elementary School, 1711 Bryden Lane at Fourth Street, Santa Rosa, unless otherwise announced in this publication. The public is invited.

**Dues:** \$25, renewable June 1 of each year. New members joining between December 1 and May 31 pay partial-year dues of \$12.50.

**Star Parties:** See the Events section for dates and times.

**Rental Telescope:** Members are eligible to borrow the club's 80mm refractor with tripod. Contact any Board member listed below.

**Egroup URL:** Connect with other members about going observing, observing reports and chat about astronomy and news items from AANC and *Sky & Telescope*. Hosted by Robert Leyland at [r.leyland@verizon.net](mailto:r.leyland@verizon.net). Any SCAS member is welcome to join. Visit <http://groups.yahoo.com/group/scas> and click the "Join" button, or send an email to [scas-subscribe@yahoogroups.com](mailto:scas-subscribe@yahoogroups.com)

**Discount Subscriptions:** For *Sky & Telescope*, new subscribers may send a check for \$32.95 payable to "SCAS", with your complete mailing address, directly to: Larry McCune, 544 Thyme Place, San Rafael, CA 94903. Once you have received the discount rate, you may renew your subscription by sending your personal check with the renewal notice directly to Sky Publishing. Discount subscriptions to *Astronomy* Magazine occur annually in October. Check *Sonoma Skies* for details.

**Library:** SCAS Librarian David Simons hosts a library of astronomy books that may be checked out by members at SCAS meetings, to be returned at the next meeting. Videotaped lectures on astronomy may be rented for \$3 per month.

**Sonoma Skies** is the monthly newsletter of the Sonoma County Astronomical Society (SCAS). Subscription is included as part of membership. Articles and member announcements are welcome and are published on a first come, first served basis, space permitting, and may be edited. **The deadline for submissions is 10 days prior to the end of each month.** Mail to: Editor, SCAS, P.O. Box 183, Santa Rosa, CA 95402, or email [publications@sonomaskies.org](mailto:publications@sonomaskies.org)

## SCAS Elected Board

**President:** John Whitehouse 539-5549 [jmw@sonic.net](mailto:jmw@sonic.net)

**Vice-President & Program Director:** Len Nelson 763-8007  
[lennelsn@comcast.net](mailto:lennelsn@comcast.net)

**Treasurer:** Larry McCune, (415)492-1426 [llmccune@comcast.net](mailto:llmccune@comcast.net)

**Secretary:** Jerry McBride, [jerry-mcbride@comcast.net](mailto:jerry-mcbride@comcast.net)

**Membership Director:** Walt Bodley 823-5268  
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**Publications Director:** Cecelia Yarnell 569-9663  
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## SCAS Appointed Positions

**Young Astronomers Advisor:** Gary Jordan 829-5288  
[SieraMolly@comcast.net](mailto:SieraMolly@comcast.net)

**Striking Sparks Program Coordinator:** Larry McCune  
(415)492-1426 [llmccune@comcast.net](mailto:llmccune@comcast.net)

**Amateur Telescope Making:** Steve Follett 542-1561  
[sfollett@sonic.net](mailto:sfollett@sonic.net)

**Librarian:** David Simons 537-6632 [davidsimons@planetatm.com](mailto:davidsimons@planetatm.com)

**Visit us on the web at:**  
[www.sonomaskies.org](http://www.sonomaskies.org)

# July Observing Notes

- 7/1 Mercury in E thru 7/15. Good morning apparition.
- 7/1 Mercury at greatest elongation west. Look for it with binoculars about 45 minutes before sunrise just above ENE horizon to left of Aldebaran. Mag. +0.5, with the disk 37% illuminated.
- 7/2 New Moon, 7:19 PM.
- 7/3 1.7% Crescent Moon, 9 PM. 21:00 alt/az 6/293; 21:15 alt/az 3/295
- 7/5 Thin crescent Moon hangs below Saturn, Mars and Regulus, creating an intriguing "celestial lineup." This should be a lovely sight!
- 7/9 Jupiter Opposition, 1 AM. Magnitude -2.7; Disk 47.4", in Sagittarius. Though still too low in the sky for crisp views, this close opposition shows the planet's disk at an impressively large 47".
- 7/10 Mars very near Saturn. 10 PM. Watch as long as you can with a clear western horizon. Mars and Saturn are separated by only 42 arc minutes, though true separation is 817 million miles. Closest approach is at about 11 PM, which is about when they set locally.
- 7/17 Moon near Jupiter, 4 AM
- 8/1 Dusk conjunctions: All of August and into early September, there will be remarkable conjunctions low in the western sky during early twilight. Very challenging for northern observers, however, the view should reward efforts on any evening if you are able to detect these objects. Venus, and later Mercury, will be easiest. Dates will be posted in this column next month.

## OBSERVING LISTS

For those of you who haven't collected these yet, are new to the hobby, or just lost yours, here are links to some of the most useful observing guides we know about, collected by and recommended by many experienced amateur astronomers.

**The Deep Map 600:** A list of 537 best deep-sky objects sorted by constellation.

<http://pages.sbcglobal.net/raycash/dmcon.htm>

**Astronomy Boy's SAA 100:** Best Non-Messier Objects for Amateur Telescopes

<http://www.astronomyboy.com/saa/>

**Steve Gottlieb's NGC/IC Observations Database Files:** Outside of the NGC itself, this is likely the most complete contemporary resource of NGC observations, by a single observer, available anywhere.

<http://ngcic.org/gottlieb/default.htm>

...and here's a website from the **Saguaro Astronomy Club** in Arizona which has lists and links to more resources:

<http://www.saguaroastro.org/content/downloads.htm>

**Orbitron Satellite Tracker:** Track the ISS, Hubble and other satellites. Prediction features, visuals, and a screensaver.

<http://www.stoff.pl/>

## CHABOT CELEBRATES 125 YEARS

by Paul David Lampe, Oakland Tribune

The Chabot Space and Science Center celebrated its 125th anniversary Friday with a ceremony dedicating a marker at its original location in Lafayette Square downtown.

"Putting the plaque here is important to show where Chabot began," said Dick Spees, chairman of the center's board.

The ceremony was followed by a 10.6-mile torch run, led by local Olympians, from Lafayette Square to the center's present location on Skyline Boulevard.

The plaque tells the story of Anthony Chabot, who donated a telescope in Lafayette Square in 1883 for the people of Oakland. Since its inception, most people have called it the Chabot Observatory, but it was originally called the "Oakland Observatory." When Chabot died in 1888, the name was officially changed to the Chabot Observatory.

"The Chabot center was built a year after the Chinese exclusion act was put in place," said Jean Quan, Oakland City Council member and chairwoman of the board for the science center. "What it means to me is the opportunity to give the poorest, most disadvantaged kids a chance (to learn more about science)."

Alexander Zwissler, executive director and chief executive officer of Chabot Space and Science Center, said, "We must make science education a priority for everyone."

Assemblywoman Loni Hancock (14th district), said the observatory is a place where children can enjoy the adventure and romance of science.

In 2000, the Chabot Space and Science Center opened at its Skyline Boulevard site. It was located off Mountain View Road between 1915 and 1999. Zwissler said the new facility includes classrooms, exhibitions and hands-on activities.

"Now we are a full-fledge science center," Zwissler said.

The Chabot Space and Science Center is one of 158 affiliates with the Smithsonian Institution. The city of Oakland, the Oakland Unified School District, the East Bay Regional Park District and the East Bay Astronomical Society work as partner organizations in governance of the center.

"I think it is a truly unifying and inspirational effort for all of the partners," Spees said. "I think it brings out the best in all of the organizations to come together and promote science education for kids."

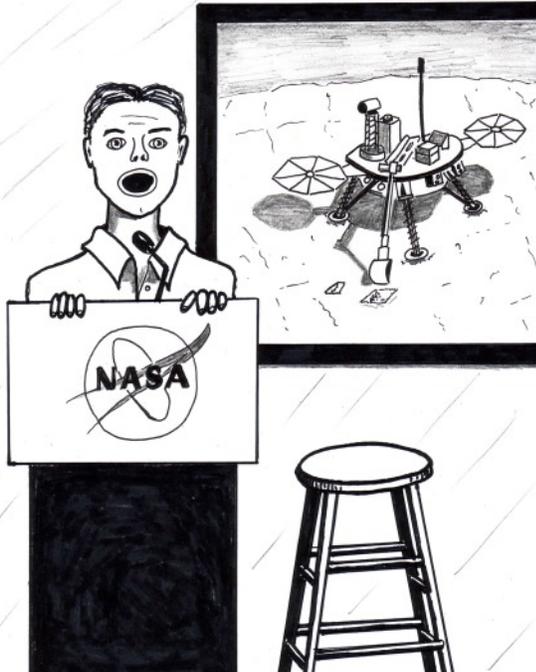
Local Olympians Marilyn King, Eddie Hart and Pamela Jiles led the torch run that included 25 runners, both adults and children. Zwissler ran the last 3.8 miles.

"It was very appropriate that we have our Olympic runners today, because it is a torch that is being carried from generation to generation," Hancock said.

## SOCIAL AMENITIES

Many thanks to Ralph and Karin Sellite for providing cold drinks, coffee and refreshments at the warm June meeting.

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The Phoenix Lander has found water and salt. And, today alcohol was discovered. Ladies and Gentlemen, the Mars Polar Cap appears to be a frozen Margarita!

*Scope City*  
NEW MEMBER BONUS!

Scope City at 350 Bay Street, San Francisco, is offering a **\$25 merchandise discount to new members.**

Manager Sam Sweiss has supported SCAS and Striking Sparks and offers a huge selection of telescopes, accessories and more. Obtain a receipt from Walt Bodley, Membership Director, showing you have paid the \$25 SCAS membership dues. To arrange for your merchandise discount, contact Sam at 415/421-8800 or at [sanfrancisco@scopecity.com](mailto:sanfrancisco@scopecity.com)

## TELESCOPE FOR SALE!



Orion Observer 60mm refractor AZ aluminum very portable collapsible mount. Available on-line new for \$100 (plus shipping) but available for sale at next SCAS meeting for *minimum bid of \$50*. In excellent condition. Lens covers. All glass is clean! Two 1.25" eyepieces: 10 & 25mm. I believe they are Kellners. Finder: Orion EZ Finder II. Instructions included. Age - 1 year. Proceeds from this sale go to the SCAS.

Any questions? Contact Len Nelson: [lennelsn@comcast.net](mailto:lennelsn@comcast.net)

# Events

## ROBERT FERGUSON OBSERVATORY PUBLIC VIEWING

**Saturday, July 26**

Solar Viewing: Noon - 4:00 PM

Night Viewing begins 9:00 PM

The Observatory features three telescopes: A 14-inch SCT with CCD camera in the East wing, an 8-inch refractor under the dome and a 24-inch Dobsonian in the West wing. SCAS members may set up telescopes in the observatory parking lot to assist with public viewing. Auto access closes at dusk; late arrivals must carry equipment from the horse stable parking area.

**Fees:** No admission fee for the solar viewing, but donations are appreciated. The Park charges \$6 per vehicle for entry. A \$3 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions.

### NIGHT SKY SUMMER SERIES

**Session #4—July 28; Session #5—August 4;**

**Session #6—August 26**

**Classes held Mondays at 7:30 PM.** Each class includes a lecture on the constellations of the season, their history and mythology, and how to find objects within them. **Fees:** \$75 for the series of six presentations. (Single session fee is \$23). 10% discount for VMOA members. Classes are held at the Observatory. For information or to register: (707) 833-6979, <http://www.rfo.org> or [nightsky@rfo.org](mailto:nightsky@rfo.org)

## RESERVE THE FERGUSON OBSERVATORY!

Groups of up to 50 can be accommodated. Astronomer docents provide sky interpretation and operate telescopes, and you can stay up as late as you want! Make your reservation at least two weeks prior to your event. Best times for optimal sky gazing are any time more than a week away from a Full Moon.

In addition to \$111 charged by the RFO for use of the observatory facilities, the State Park System charges \$111 for use of the *Group Campground*. Because it is adjacent to the Observatory, the group camp must be reserved for private events. Total Cost: \$222. For information on how to reserve, visit [www.rfo.org](http://www.rfo.org) or contact George Loyer at [gloyer@rfo.org](mailto:gloyer@rfo.org).

## SCAS IN YOSEMITE AUGUST 8 & 9

This year our weekend in Yosemite is August 8 & 9. For once the Yosemite weekend does not conflict with an RFO Public Night. Lynn Anderson will be out of the country for several weeks before the Yosemite weekend, so Len Nelson ([lennelsn@comcast.net](mailto:lennelsn@comcast.net)) will coordinate the sign-ups for this event. Let him know who you are, how many in your party and how many telescopes you will be bringing. The National Park Service allows us only 5 campsites, with each site limited to 6 people and two vehicles. While sometimes people can go to Yosemite and secure extra campsites, last year there were no extra campsites available, so sign up early or be wait listed.

## MT. TAMALPAIS ASTRONOMY

**July 12, 8:30 PM: “The Microwave Background - A Cosmic Time Machine”**—Dr. Adrian Lee, UC Berkeley

Researchers use telescopes in stratospheric balloons, at the South Pole, and in the high Andes to map the faint cosmic background radiation that give a baby picture of the Universe just after the Big Bang.

Sponsored by the Mt Tamalpais State Park and coordinated by volunteers of the Mt Tam Interpretive Association. FREE and open to the public. Families and students encouraged to come. Presentations held in the Mountain Theatre. Viewing afterwards in Rock Springs Parking Area, provided by San Francisco Amateur Astronomers. Dress warmly and car pool if possible. Bring a flashlight! Info: 415/455-5370; <http://www.mttam.net/>

## SILICON VALLEY LECTURE SERIES FREE PODCASTS

Podcast audio recordings of twelve public lectures recorded at Foothill College in the Silicon Valley Astronomy Lecture Series by noted astronomers are now available as free MP3 downloads at the web site of the nonprofit Astronomical Society of the Pacific (ASP):

<http://www.astrosociety.org/education/podcast/index.html>

Podcasts are made available to the public through the kind support of a donor with a strong interest in education who wishes to remain anonymous. Each hour-long lecture on some exciting development in our study of the universe is followed by an extensive question and answer period, in which the speaker gives further details and personal glimpses about the topics under discussion.

A sample of the talks now available are:

Dr. Jill Tarter (SETI Institute): “Better Searches for Signals from Extra-terrestrial Civilizations”

Dr. Geoff Marcy (U. of California, Berkeley): “Hunting for Earth-like Planets Among the Stars”

Enjoy!

## SCAS Star-B-Que August 23

Come to the SCAS Annual Star-B-Que at the Robert Ferguson Observatory in Sugarloaf Ridge State Park! Get to know your fellow astronomers and their families in daylight! After dark there will be a sky tour, pointing out the different constellations and many interesting features in our Summer Sky. It's a good time for beginners to get help learning the sky or using a telescope. Striking Sparks winners can get help adjusting their new telescopes. Bring your scope and its instruction manual, your planisphere, and a list of questions.

**Times and what to bring:** We are allowed in at noon. Solar viewing will begin at 2 PM. See the 24" reflector in the daylight and have your photo taken with it! The barbecue fire will be started about 5 PM so we can begin cooking around 6 PM. SCAS will provide the barbecue fire and marshmallows. You bring food to barbecue, a favorite potluck dish to share, other food, drinks and utensils, red cellophane for your flashlight, and a measure of good cheer.

**To camp overnight:** Adjacent to the Observatory is the Group Campground parking area, campsites, running water, large barbecue pits, and outhouses. You may camp overnight (no RV hookups). Everyone must leave by noon Sunday. The Star-B-Que is intended for SCAS and YA members, Striking Sparks winners, their families and a few guests.

**Directions to Sugarloaf Ridge State Park:** Take Hwy. 12 from Santa Rosa toward Sonoma. Turn left onto Adobe Canyon Rd. just before you reach Kenwood. It is 8.6 miles from Fourth and Farmer's to the Adobe Canyon Rd. turnoff. From Sonoma, it's a right turn after Kenwood. The Park is 3.4 miles farther.

**Fees and Parking:** At the Park entrance kiosk, identify yourself as part of the Sonoma County Astronomical Society headed for the Star-B-Que at the Observatory. There will be no individual fees. Pets must be kept on a leash, with a \$1.00 charge for each animal. Parking is limited, so carpool if possible. To minimize jarring white light from backup lights after dark, please park by backing in. Park close together, with just enough room to open your door. Parking on pavement is prohibited. If you arrive after 8:30 PM, or if campground parking is full, park next to the group campsite entrance gate, about 100 yards away.

Call Len Nelson at 763-8007 or email [lennelsn@comcast.net](mailto:lennelsn@comcast.net) if you have questions. Hope to see you there!

**Important!** There will be *no August meeting* at Proctor Terrace School. Join us for the Star-B-Que instead.

## SCAS COMMUNITY ACTIVITIES

**Summer School in Sonoma:** Once again we have been asked to provide telescope viewing and a slide show for the Common Bond Language Camp at El Verano Elementary School, 18606 Riverside Dr. in Sonoma. The scheduled date is Wednesday, July 23. Sunset is not until 8:26, so viewing will be mostly limited to Jupiter, Saturn, Mars, and maybe Venus. Nautical twilight is not until most of the children should be heading off to bed around 9:30 and the waning gibbous moon is not scheduled to rise until shortly after 11:00. Those of you who attended this enthusiastic event last year will remember the (mostly authentic Mexican food) pot-luck dinner that was provided to the SCAS volunteers. This year the Common Bond Program Director has assured me that there will be an even bigger and better feast.

I will be out of the country for this event, so if another volunteer is willing and able to give a short PowerPoint slide show, those efforts would be appreciated.

**Art in Sebastopol:** Looking ahead, we have been asked to provide telescope viewing at an art opening at the Sebastopol Center for the Arts, 6780 Depot Street, Sebastopol, CA 95472 on Friday, September 12th from 6:00-8:00 PM. The press release that has been sent to me tells that many of the art on display will have an astronomy theme.

If you have time to donate, fuel in your gas tank and are willing to drive or share a ride with another volunteer to either or both of these events, please contact me at [astroman@sonic.net](mailto:astroman@sonic.net)

—Lynn Anderson, SCAS Director of Community Activities

## EXPLORATORIUM TOTAL SOLAR ECLIPSE 2008

### From Xinjiang Province in Northwestern China

Spend the Night at the Exploratorium! See the eclipse in person live at the Exploratorium. Pack your sleeping bag and camp out on the museum floor for an overnight eclipse party. This event will capture and actively observe the full eclipse, and investigate space weather and the sun as a power source. It is both a celebration and party, a look at Chinese culture, and pure Sun-Earth Connection science. The celebration begins with astronomers, food, music, and of course, tea/caffeine, to keep you alert for the big event.

Doors open at 9pm, Thursday July 31. Films and solar science activities, like spectroscopy making, will be held, as well as the sorts of traditional Chinese performances that mark special occasions, and in the name of science, roving astronomers to answer questions. General admission will be open from 9pm-midnight. Museum capacity is limited; we may sell out early. We strongly encourage advance reservations through [www.ticketweb.com](http://www.ticketweb.com).

# Young Astronomers



## HAPPY SUMMER VIEWING, YOUNG ASTRONOMERS

As you know, YA meetings are suspended for the summer. However, all the SCAS activities are open to you, and we would be delighted to see you. Please feel free to join us for observing at the Ferguson Observatory (see Page 4), and at our meetings and other events. Happy Skywatching!

## Closing in on Extrasolar Earths

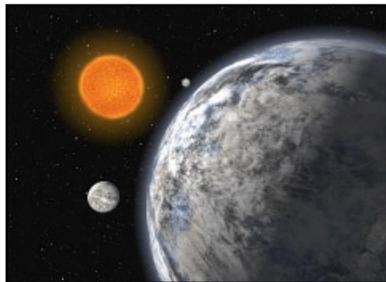
Little more than a decade ago, astronomers Michel Mayor and Didier Queloz announced the discovery of a planet in orbit about 51 Pegasi. It rushes around its sun in just over four days, seared to a temperature of 1,000 degrees Celsius (about 1,800 degrees Fahrenheit).

Today, we call this sort of planet a “hot Jupiter.” This was the first planet found orbiting a main sequence star — a star similar to our sun.

Earlier, the irregular beat of a pulsar revealed the cindered remains of planets orbiting the corpse of a dead star. Most likely, they formed after the supernova death of their parent star, which indicates that planet formation is a likely outcome from a disk of material. These pulsar planets are not good places to live. But discovering 51 Pegasi around a more ordinary star kicked off a great planetary gold rush.

Almost weekly, there’s an announcement of yet another extrasolar planet around a neighborhood star. This week, it’s a triple system of super-Earths discovered at the European Southern Observatory at La Silla using the HARPS (High Accuracy Radial velocity Planet Searcher) instrument.

The planets, having 4.2, 6.7, and 9.4 times the mass of the Earth, orbit the star with periods of 4.3, 9.6, and 20.4 days, respectively. These short periods place the trio of new planets well within the orbit of Mercury around the sun. So, again, these are hot planets, well inside the habitable zone of their star. This trio,



*This artist's impression shows the newly discovered trio of super-Earths orbiting a sun-like star, HD 40307. Credit: ESO*

and others, were announced this week at the international conference, “Extra-solar Super-Earths,” and demonstrate that small planets are likely common.

“Clearly these planets are only the tip of the iceberg,” says Michel Mayor, team leader for this discovery. “The analysis of all the stars studied with HARPS shows that about one third of all solar-like stars have either super-Earth or Neptune-like planets with orbital periods shorter than 50 days.”

These planets are like the proverbial gold nuggets sought by the 49ers here in California. They mark the trail to the mother lode, where the ultimate goal is to find another Earth.

Only a handful of the 300-plus planets known to exist are categorized as super-Earths. The ground-based radial velocity method preferentially reveals Jupiter-sized planets. They induce greater spectral shifts in their stars. Tiny terrestrial planets the size of Earth hardly disturb their parent stars, and their radial velocity signatures are lost in the noise.

Super-Earths are beginning to be found with high-precision instruments like HARPS. Hints of small planets have also been reported by the COROT (CONvection ROTation and planetary Transits) Mission and by the gravitational lensing experiments underway.

But the holy grail — an Earth-size planet in the habitable zone of its star — awaits NASA’s Kepler Mission.

The Kepler spacecraft launches in February 2009, 400 years after Johannes Kepler published his first two laws of planetary motion in *Astronomia Nova*, the “New Astronomy,” which first described planets orbiting on ellipses and at varying speeds around the sun. Ten years later, he published his third law, which relates the period of the planet to its mean distance from the sun. Kepler used his discoveries to predict solar transits of Mercury and Venus, but did not survive to observe them.

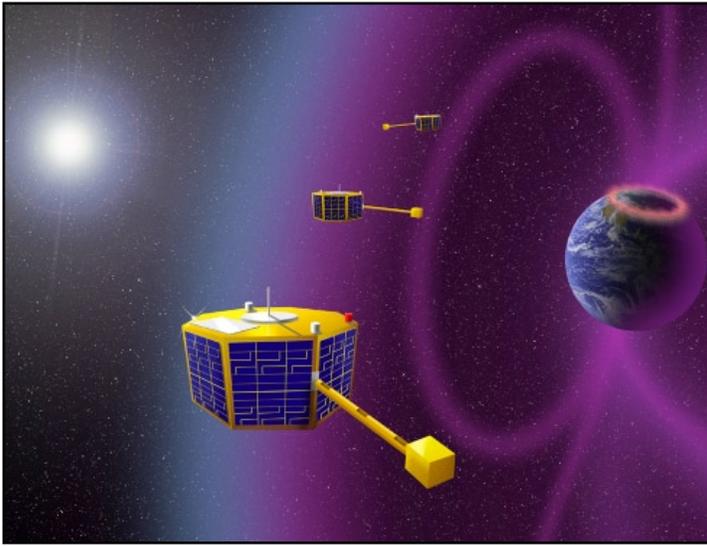
Soon, NASA scientists will seek transits to discover Earth-size planets about distant stars. And, they named the mission in honor of Johannes Kepler.

The Kepler Mission is especially designed to discover small planets around sun-like stars by observing transits. The Kepler Mission will observe more than 100,000 stars for at least 3.5 years, seeking evidence of other Earths. Lots of hot, close-in planets will be discovered in the first months of the mission.

Finding Earth-size planets in Earth-like orbits requires patience, because observations must be repeated to confirm discoveries. If an alien astronomer in a distant solar system were looking for us, Earthly transits would be seen once per year, and that good astronomer would require at least three transit observations to announce a discovery. The same is true for the Kepler scientists. Kepler’s scientific prospectors should be announcing discoveries of Earth-size planets in habitable zones by 2011-2012.

In my opinion, that’s a short wait to answer the question, “Are there other planets like Earth orbiting distant suns?” We’re approaching the mother lode of distant solar systems, and the Kepler Mission promises a major advance toward understanding whether we are alone in this vast universe.

—by Edna DeVore, Director of Education and Outreach, SETI



The Space Technology 5 micro-satellites proved the feasibility of using a constellation of small spacecraft with miniature magnetometers to study Earth's magnetosphere.

**NASA SpacePlace**

# Space Buoys

by Dr. Tony Phillips

Congratulations! You're an oceanographer and you've just received a big grant to investigate the Pacific Ocean. Your task: Map the mighty Pacific's wind and waves, monitor its deep currents, and keep track of continent-sized temperature oscillations that shape weather around the world. Funds are available and you may start immediately.

Oh, there's just one problem: You've got to do this work using no more than one ocean buoy.

"That would be impossible," says Dr. Guan Le of the Goddard Space Flight Center. "The Pacific's too big to understand by studying just one location."

Yet, for Le and her space scientist colleagues, this was exactly what they have been magnetosphere is an "ocean" of magnetism and plasma surrounding our planet. Its shores are defined by the outer bounds of Earth's magnetic field and it contains a bewildering mix of matter-energy waves, electrical currents and plasma oscillations spread across a volume billions of times greater than the Pacific Ocean itself.

"For many years we've struggled to understand the magnetosphere using mostly single spacecraft," says Le. "To really make progress, we need many spacecraft spread through the magnetosphere, working together to understand the whole."

Enter Space Technology 5.

In March 2006 NASA launched a trio of experimental satellites to see what three "buoys" could accomplish. Because they weighed only 55 lbs. apiece and measured not much larger than a birthday cake, the three ST5 "micro-satellites" fit onboard a single Pegasus rocket. Above Earth's atmosphere, the three were flung like Frisbees from the rocket's body into the magnetosphere by a revolutionary micro-satellite launcher.

Space Technology 5 is a mission of NASA's New Millennium Program, which tests innovative technologies for use on future space missions. The 90-day flight of ST5 validated several devices crucial to space buoys: miniature magnetometers, high-efficiency solar arrays, and some strange-looking but effective micro-antennas designed from principles of Darwinian evolution. Also, ST5 showed that three satellites could maneuver together as a "constellation," spreading out to measure complex fields and currents.

"ST5 was able to measure the motion and thickness of current sheets in the magnetosphere," says Le, the mission's project scientist at Goddard. "This could not have been done with a single spacecraft, no matter how capable."

The ST5 mission is finished but the technology it tested will key future studies of the magnetosphere. Thanks to ST5, hopes Le, lonely buoys will soon be a thing of the past.

Learn more about ST5's miniaturized technologies at:

<http://nmp.nasa.gov/st5/>. Kids (and grownups) can get a better understanding of the artificial evolutionary process used to design ST5's antennas at:

<http://spaceplace.jpl.nasa.gov/en/kids/st5/emoticon/>.

—Article provided by JPL/NASA

## YA INFORMATION

Meetings: 7:30 PM the second Friday of each month of the school year, at Apple Blossom School, 700 Water Trough Road, Sebastopol, in the Multipurpose Hall. Open to all Sonoma County students. Telescope viewing is held in the upper parking lot after the meeting. Directions: From Hwy. 116 in Sebastopol, go west onto Bodega Ave. Continue almost two miles to Water Trough Rd. Turn left and go about 1/3 mile to the school, on your right.

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Astronomical Society**

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***Sonoma Skies***  
**July 2008**

JULY 9

**Roving Mars**