Sonoma Skies

Newsletter of the Sonoma County Astronomical Society

A nonprofit scientific and educational organization

www.sonomaskies.org

December 2006 Volume XXIX No. 10

December is SCAS Election Month

November's meeting at Santa Rosa Junior College did not allow us to conduct a "normal" business section of the meeting. Therefore, we were unable to discuss nominations for next year's officers. Most of the current officers have agreed to continue at their posts, but are willing to be challenged should someone else want to run for a particular office. However, two important offices do need to be filled—President and Vice President.

_____(Your Name Here) for SCAS President
_____(Your Name Here) for Vice President

Our current President, John Whitehouse has several projects that will be taking his time away from SCAS leadership. Lynn Anderson, the current Vice President, will be running for Community Activities Director. The current Community Activities Director, Len Nelson, is stepping down after seven years in that elected assignment. The other officers—Secretary, Loren Cooper; Treasurer, Larry McCune; Membership Director, Walt Bodley; and Publications Director, Cecelia Yarnell—have indicated that they are willing to continue in those offices.

The duty of President requires attending and running the regular and board of directors meetings, appoint and supervise committees, read through the mail we receive from ASP and AANC and other business mail, and keep the other board members and the general membership informed of activities and other items of interest within the astronomical community. Besides attending monthly regular and board meetings, the duties of President typically require 2-4 hours/month at the computer or on the telephone.

The Vice President's principle responsibility is to carry on the duties of the president in his/her absence. In recent years the Vice President has also assumed the duties of Program Director, who secures and arranges for speakers at the regular SCAS meetings. He/she also writes an introductory article for *Sonoma Skies*. Typically the speaker will provide a brief biography and summary of the program topic, so most of the newsletter articles write themselves. The Vice President/Program Director typically requires 1-3 hours per month, communicating with potential program speakers.

To paraphrase our 35th US President, "Ask not what your astronomy club can do for you, ask what you can do for your astronomy club." Are you willing to dedicate several hours per month to SCAS? You will not be alone. The current and recent board members are here to assist you to make a smooth transition.

Going to the Moon, Going to Mars: How and Why

SCAS *December 13* Meeting, Proctor Terrace School

NASA has begun a program of human exploration of the Moon and then Mars. Dr. Christopher P. McKay, Planetary Scientist with the Space Science Division of NASA Ames, will discuss the completed design of the vehicles that will be built to support this program. In addition, the robotic lunar exploration program that will be the precursor to human exploration of the Moon has begun. The first mission is an orbiter and the second mission is lander targeted for the lunar south pole region.

Chris received his Ph.D. in AstroGeophysics from the University of Colorado in 1982 and has been a research scientist with the NASA Ames Research Center since that time. His current research focuses on the evolution of the solar system and the origin of life. He is also actively involved in planning for future Mars missions, including human exploration. Chris been involved in research in Mars-like environments on Earth, traveling to the Antarctic dry valleys, Siberia, the Canadian Arctic, and the Atacama desert to study life in these Mars-like environments. He was a co-I on the Titan Huygen's probe in 2005, the Mars Phoenix lander mission for 2007, and the Mars Science Lander mission for 2009. He is deputy program scientist for Constellation, the NASA program for future human exploration of the Moon and Mars.

Please join us December 13 for this fascinating discussion of coming missions. The public is welcome.

Coming to SCAS in January

Lynn Anderson will showcase the Night Sky Network's newest teaching tools, "Shadows and Silhouettes" at the January 10 meeting at Proctor Terrace School.

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*. 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*

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. For renewals, send him your check with the completed renewal card and return envelope. Discount subscriptions to ***Astronomy*** Magazine occur annually in October. Check ***Sonoma Skies*** for details.

Library: SCAS Librarian Joan Thornton 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*

SCAS Elected Board

President: John Whitehouse 539-5549 *jmw@sonic.net*
Vice-President & Program Director: Lynn Anderson 433-1154 *penumbra@sonic.net*
Treasurer: Larry McCune, (415)492-1426 *llmccune@comcast.net*
Secretary: Loren Cooper, 525-8737 *lorenco@sonic.net*
Membership Director: Walt Bodley 823-5268, *membership@sonomaskies.org*
Community Activities Director: Len Nelson 763-8007, *lennelsn@comcast.net*
Publications Director: Cecelia Yarnell 569-9663, *publications@sonomaskies.org*

SCAS Appointed Positions

Young Astronomers Advisor: Gary Jordan 829-5288 *SieraMolly@aol.com*
Striking Sparks Program Coordinator: Larry McCune (415)492-1426 *llmccune@comcast.net*
Amateur Telescope Making: Steve Follett 542-1561 *sfollett@sonic.net*
Librarian: Joan Thornton 762-0594 *phonyjoanie@earthlink.net*

Visit us on the web at:
www.sonomaskies.org

President's Message

by John Whitehouse

Greetings, fellow star lovers! As the cool weather comes, the trees and vines turn their beautiful fall colors, the days grow shorter, shadows grow longer, we are reminded of the rhythms and cycles of the seasons and our lives. Those of us who are attuned to such things realize these are expressions of the clockwork nature of our planet's tilt and motion around our star, alongside all of our fellow planets.

Hopefully you got to enjoy the spectacular weather on the day nature's clockwork brought Mercury across the face of the sun for the transit. I had a wonderful experience doing public astronomy with the iconic Sidewalk Astronomer, John Dobson. I picked him up that morning and we set up my filtered refractor and two of his original solar telescope designs at the Santa Rosa Junior College. (A scope can't get any more "Dobsonian" than that!) We set up in front of the cafeteria/student union building and treated hundreds of people to a view of the little freckle moving across the face of old Sol. The beautiful day, delighted audience and the chance to spend a lot of time visiting and listening to Dobson were a real treat for me. At 91 years old his energy and agility, both mental and physical, were a real inspiration.

Later that evening we moved over to Baker Hall to listen to John give a talk on whatever he had on his mind, as well as answering questions from our members and the astronomy students from the JC who we'd invited. Dobson is quite an original thinker, bringing a lot of unique ideas and perspectives to cosmology and more. This from a man who has been a Vedantic monk but also spent time with the likes of Neils Bohr, Richard Feynman, Alan Sandage and many other great thinkers of our era.

The week before I had done some outreach at the Sonoma Mission Inn. There was a symposium of physicians there, and they had invited an astronomer to augment the evening's entertainment. I gave a short talk and treated many of the guests to a view of the full moon. I enjoyed the enthusiasm and the good questions this group had. I also enjoyed a nice meal and when asked by the wine expert giving her presentation which wine goes with stargazing, I responded "champagne, of course". She said that Dom Perignon had said that champagne was "like drinking stars", so I guess my answer was on the mark!

Another mark of the season's march is the approach of the end of the calendar year. This next meeting we will be electing our officers and board members. In the interest of continuing to make SCAS a vital group, I'd like to ask that you all consider participating in the club by serving on the board if you can. We're all volunteers, and nothing gets done unless somebody does it. We welcome your ideas and your energy. Besides, it's a nice group of folk to be with.

Finally as we approach the solstice, I hope you get a chance for some clear skies for some observing on these long nights; but also that you have a warm, wonderful holiday season filled with friends and loved ones. Cheers!

December Observing Notes

12/3 Lunar occultations—see below.
12/4 Full Moon
12/10 Waning gibbous Moon close to Saturn
12/10 Mercury near Mars and near Jupiter—see below
12/12 Last Quarter Moon
12/15 Crescent Moon very near Spica
12/18 Mars near Antares.—see below.
12/20 New Moon
12/21 The Winter Solstice occurs at 4:22 AM PST
12/22 Ursid meteor shower peaks
12/27 First Quarter Moon
12/31 Pleiades occultation in the morning, with the moon low WNW

Observing Treats

12/3—Lunar Occultations: On the early morning of 12/3, the binary epsilon Ari disappears behind the dark limb at 12:40am, its companion disappearing about 2 seconds before the primary (use high magnification!). Then, at 12:48, the asteroid Iris (mag 7) disappears. At 1:40am, epsilon Ari reappears from the bright side (difficult).

On the evening of 12/3, an occultation of the Pleiades occurs in the ENE—stars will disappear on the dark limb and reappear on the bright limb: 23 D 5:14pm; 17 "near miss" 5:17; 24 D 5:43; eta D 5:45; 23 R 6:09 On 12/27 we have: 62 Psc D (dark) 9:49pm; delta Psc D 10:30; delta R 11:11 (difficult).

12/10 & 11—Mercury near Mars and near Jupiter: At their closest on 12/10, these three planets will fall within a circle 1° across. This is the closest grouping of 3 naked-eye planets since 1980 and another such grouping won't occur until 2050! Observing these conjunctions will be a challenge. The three planets will be very low (6° altitude) 30 minutes before sunrise. Select a site with a very clear ESE horizon. Begin looking by 6:45AM—you will have a brief time to spot the planets before the sky becomes too bright (use binoculars). Jupiter is brightest (mag -1.7), then Mercury (mag - 0.6), then orange-red Mars (mag 1.5).

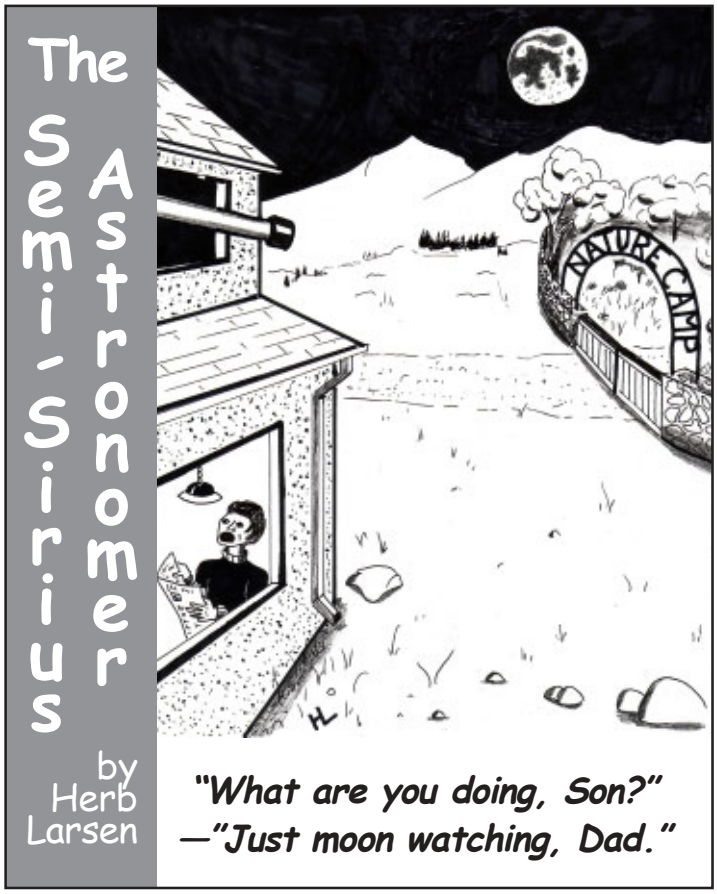
12/18 & 19—Mars near Antares: Jupiter will be just above them, and a thin crescent moon joins the group on 12/18. The name "Antares" means "rival of Mars" since this orange-red supergiant star much resembles Mars. We have this opportunity to make our own comparison. The slightly variable Antares will be slightly brighter than Mars.

—Most of above info courtesy of Jack Welch

Interesting Links

NASA and SETI Explorers Search for Planetary Evolution Clues on Earth: To go where few people have gone before, a team of expert scientists, mountain-climbers, and divers will explore the ecosystems of three high-altitude summit lakes to understand microbial life's adaptation to these challenging environments. Visit: *http://highlakes.seti.org/*

Planetary Society's Solar Sail Project: The bigger the dream, the harder it is to achieve it. The Planetary Society's dream is to fly the first solar sail mission—and prove the technology that might someday take humanity to the stars. Visit: *http://planetary.org/programs/projects/solar_sailing/20061020.html*



Social Amenities

Thanks to Phil Marshall for providing coffee and refreshments at the November meeting.

You can sign up to provide refreshments at a meeting, too. It's easy! Just contact any Board member and choose a month.

Ottewell *Calendar 2007*

If you placed an order for one of these calendars, it will be available to pick up at the December SCAS meeting. Bring cash or checks made out to Lynn Anderson in the amount of $21.06 (which includes the shipping charge) for each calendar. Thanks..

Pun of the Day

When astronauts die they run an orbituary.

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*

Events

Robert H. Ferguson Observatory

Next Public Viewing: Saturday, January 20
Solar Viewing: 11:00 AM - 3:00 PM
Night Viewing begins 7:00 PM

No Public Events are scheduled for December

The Observatory: Three scopes are operating: The 14-inch SCT with CCD camera in the East wing, the 8-inch refractor under the dome and the 24-inch Dobsonian in the West wing. No admission fee for the solar viewing, but donations are appreciated. The Park charges $6 per vehicle for entry. A $2 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions.

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.

Classes, Other Events

Dec. 12 Night Sky Fall Series, 7:00 PM

Classes are held at the Observatory. Reservations recommended. (707) 833-6979, *http://www.rfo.org* or *nightsky@rfo.org*

Reserve the Observatory for your Group

In addition to RFO public events, you may reserve the Observatory for families, private groups, company outings, or school programs. Astronomer docents are provided to operate the telescopes and answer questions. 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. For more information, visit *www.rfo.org* and follow the pull-down menus "About/RFO/Reserve RFO", or contact George Loyer at *gloyer@rfo.org*.

Morrison Planetarium Dean Lecture Series

Dec. 11, 7:30 PM: "The Science of Spirit and Opportunity"—Dr. Albert Haldemann, NASA Jet Propulsion Laboratory:

"The Science of Spirit and Opportunity" - Kanbar Hall at the The scientific results obtained to date from the Mars Exploration Rovers are extensive. In one and a half Martian years on the planet Spirit has explored the varied rocks of the 'Columbia Hills,' from the summit of 'Husband Hill' into the 'Inner Basin,' while Opportunity verified past surface water in sedimentary rocks kilometers apart inside 'Eagle Crater,' 'Endurance Crater,' 'Erebus Crater' and 'Victoria Crater.'

Location: Kanbar Hall, Jewish Community Center, 3200 California Street (at Presidio). Parking in the UCSF Laurel Heights campus parking lot is $1.25/night. Parking in the JCC garage is $1.25 per half-hour. Tickets $4 at the door or by email. Contact: 415/321-8000, *http://www.calacademy.org/planetarium/dean.cfm*

SRJC Planetarium

"Our Winter Holiday Sky" — Through Dec. 17

Join us as we take you on a tour of the winter sky. We'll help you find the major stars and constellations, star clusters, star forming regions, and the most distant object your eyes may be able to see in space. You'll learn about the astrological phenomenon that may have been interpreted as the Star of Bethlehem.

Shows are held at Santa Rosa Campus, Lark Hall, Room 2001, on Fridays and Saturdays at 7:00 PM and 8:30 PM, Sundays at 1:30 PM and 3:00 PM during the Fall and Spring semesters. Admission is $5 General; $3 Students and Seniors (60+). Tickets are sold at the door only, beginning 30 minutes before show time. A parking permit is required and is included in the Planetarium admission price. Pick it up at the planetarium when you pay admission. Please arrive early enough to place your permit on your vehicle's dashboard before the show starts.

Info: 527-4372, *http://www.santarosa.edu/planetarium/*

SSU Observatory Public Viewing

Dec. 1, 7-9PM: The Moon, Auriga Clusters, M77 (a Seyfert galaxy)

Observatory located inside the stadium area at the SE corner of campus (E. Cotati Ave. and Petaluma Hill Rd., two miles east of US 101 at Cotati). Follow signs to campus. Parking Lot F is most convenient. Call 707/664-2267 before coming if it appears weather may force cancellation. *http://www.phys-astro.sonoma.edu/observatory/pvn.html*

Chico's Open Sky Planetarium

Located in upper Bidwell Park, next to Horseshoe Lake and the Kiwanis Chico Observatory, the Shoemaker planetarium is sunk into a hillside—an open-air amphitheater built in two concentric, tiered rings, with angled concrete walls to support viewers as they look upward to the skies or into monitors in their hands.

Kris Koenig (foreground) demonstrates one of the hand-held monitors visitors will use to view stars in the new Planetarium.

Stargazers will be able to follow a green-glow laser into the night skies as galaxies, constellations and other sky life are pointed out during the program. At their fingertips, hand-held, wireless monitors will give a close-up of the spotlighted area, as viewed through the observatory telescopes. "The combination of live sky and technology has never been utilized in a venue to educate and entertain the public on astronomy," said Koenig.

The observatory and planetarium are open from 6 to 9 PM Thursdays through Sundays, and by appointment. Admission is free. Info: *http://www.chicoobservatory.com/*

Events

UC Berkeley Astrophysics Club

Institute for Particle Astrophysics Journal Club Seminars

Dec. 1—Kristen Shapiro (UCB) "Testing Mass Assembly in the Early Universe"

I will present recent results from the SINS study of spatially resolved galaxy kinematics at z~2. This observing program is made possible by the new class of integral-field spectrographs that operate in the infrared with high spatial and spectral resolution Such studies reveal a surprising Universe, in which massive disks are already in place, after an apparent very rapid assembly.

Dec. 8—Jennifer Carson (SLAC), Topic to be announced.

Dec. 15—Kyle Dawson (LBNL/INPA) speaking on new results from the SCP cluster search.

Lectures: 12:00 Noon. Location: Bldg. 50, room 5026, Lawrence Berkeley National Laboratory, 1 Cyclotron Rd., Berkeley. Contact Vitaliy Fadeyev *VAFadeyev@lbl.gov*. Information: *http://stokstad.lbl.gov/INPA/journalclub.html#aboutjclub*

SCAS Members Provide Public Astronomy for the Mercury Transit Nov. 8

Len Nelson & Harry Linder at Petaluma schools:

I had been to both schools in the 2 days prior to the transit and gave a PowerPoint presentation (using materials from the Night Sky Network's 'transit' kit) to the students who would witness the event though my scope & the SCAS's SunSpotter. Clear warnings were given as to the consequences of looking at the sun with ordinary binoculars, telescopes or even bare eyes.

Photos by Len Nelson

Harry Linder and I got to Old Adobe School and set up just prior to the transit beginning so a number of students (and teachers) got to see the sun with only the sun spot on its surface. Then, as Mercury began its transit we assured that they all saw it again and identified which was the sun spot (and what it was) and where Mercury was. 45 students, 3 teachers and the principal enjoyed the spectacle with us at Old Adobe.

Harry Linder with the students at Old Adobe

At 12:00 we were off to Meadows elementary about 2 miles away. I called the teacher on my cell phone when we arrived and 20 minutes later when we were set up again she came with 23 students from her special 3rd grade class.

Lynn Anderson in Santa Rosa:

I set up at Austin Creek Elementry School in eastern Santa Rosa. I had been there on Tuesday and used the ASP' Night Sky Network "Shadows & Silhouettes" Sun-like Stars and "Kepler" mission PowerPoint presentations as an introduction to the importance of transits. The presentation was to two classes of 6th graders. I set up my 8" SCT with a neutral density and my TeleView Pronto with my h-alpha. Neither were motor driven, so I was kept busy fielding questions from the groups of 10 students at a time and keeping the two telescopes aligned. One classroom came out before their lunch break and the other class after lunch. There was a smattering of parents, teachers and other adults who had business around the school who also stopped by for a look. Then school dismissed for the day and it got a little chaotic with lots of curious children and parents, but I survived.

Elsewhere in the county there was a group of the docents at the Robert Ferguson Observatory that reported good viewing until the sun went behind the trees. It was reported that several of the campers and park day users got to see the tiny speck.

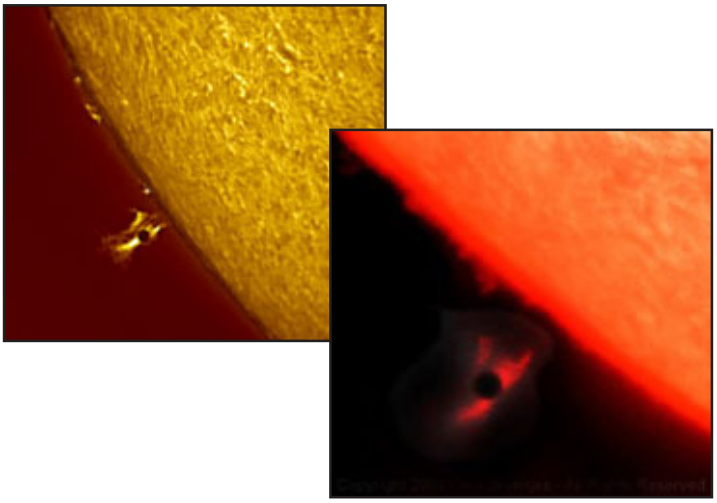
Another group of Sonoma County Astronomical Society members set up solar scopes in front of the Student Union at Santa Rosa Junior College, where they were joined by John Dobson, who was the guest speaker at the SCAS meeting last night.

Upcoming School Star Parties

January 11, 2007 - Piner Elementary in Santa Rosa (1/12 is an alternate possibility)

January 22, 2007 - Cub Scouts - Santa Rosa

January 24, 2007 - Meadow Elementary in Petaluma



Amazing shots of Mercury passing a solar prominence, posted on Spaceweather.com

Young Astronomers

Mining for Micrometeorites

YA *December 15* Meeting,
7:30 PM at Apple Blossom School

Believe it or not, you have a wealth of meteorites at home. They're on the roof of your house, on the leaves of the plants in your yard, in the dirt and dust on your walkway. Unfortunately, they're of the microscopic variety, too small to see without proper collection techniques and a good microscope. Join us for the December 15th YA meeting and you'll have a chance to search for these microscopic "visitors from space." We'll have a hands-on activity where we'll try to collect and examine micrometeorites using magnets and microscopes. Bring your curiosity and your patience for this fun lab activity! Weather permitting, bring your telescope as well for star viewing after the general meeting.

November YA Meeting Update

The November presentation was given by Young Astronomers president Melissa Downey. In this informative and well-researched lecture, Melissa told us about the different ways of looking at constellations, the way they cycle throughout the seasons, and some of their history. In particular, she told about their importance in many ancient myths, such as the story of Andromeda and Perseus, as well as their many other significances in ancient civilizations (the layout of the Egyptian pyramids, calendars, etc.) As she reminded us at the end of the show, we should all remember to look at stars not just with the eyes of scientists, classifying them and thinking only in numbers, but also as appreciators of their twinkling splendor.

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.

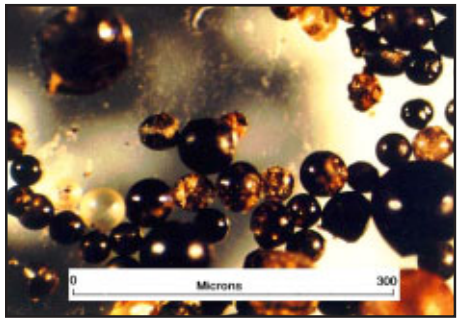
YA ELECTED OFFICERS

President: Melissa Downey 632-5661
VP/Program Director: Olivia Turnross *jtec@sonic.net*
Recorder: Marie-Pierre Frigon 773-3206
Newsletter Editor: Open
Librarian: Rachel Loughman, *stop_rachel_4_insanity@yahoo.com*
Adult Adviser: Gary Jordan 829-5288

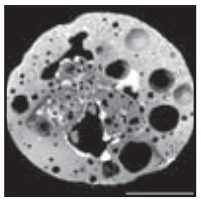
Mining for Micrometeorites

How many people have been struck by meteorites falling from the sky? You may not believe this, but we all have been...repeatedly! While injuries from fallen meteorites of significant size are extremely rare, falling all around us and onto us each day are the meteorites smallest siblings, micrometeorites.

While it is generally believed that meteorites are fairly rare, in reality about 30,000 tons of extraterrestrial material are deposited on Earth each year; bits of comets, chunks of asteroids, debris from the formation of our solar system more than four billion years ago. So why aren't meteorites seen more often sitting on the ground? First, the largest portion of this material falls into the oceans, and secondly, most of the material that reaches the surface is microscopic, much too small to be noticed. These are the tiny specimens known as micrometeorites. As tons of micrometeorites fall each year, they gently land in our fields, on our homes, and on us.

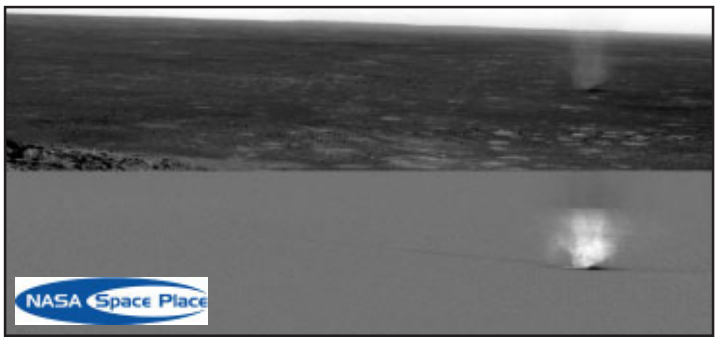


Here is a way that you can collect micrometeorites in your own backyard, with the help of the rain. Micrometeorites fall everywhere, but collect very nicely on roofs. When rain falls, "space dust" is washed off the roof and through the downspouts. All you need to do is position a deep bowl or bucket under a downspout. Many things will collect in your bucket, such as leaves, twigs, sands, etc. Collect this material from your bucket and dry it out. Remove the larger pieces of debris, such as leaves, and spread the remaining material on a sheet of paper (or plastic). Slowly run a strong neodymium magnet back and forth under the paper. (Note: Whenever using a neodymium magnet to collect particles, it's always a good idea to place it in a plastic bag to keep it clean.) When you feel you have attracted most of the metallic particles, tilt the paper up so that the non-ferrous materials fall from the sheet.



Much of what you have collected will be Earth-born debris. To find the micrometeorites you will need to examine the collected particles under a microscope. High power will be required to see them clearly. Look for particles that are rounded and may have small pits on their surface. This is evidence of a micrometeorite's fiery trip through the atmosphere.

—Adapted from the **Teachersource.com** *newsletter*



NASA/JPL/Mark T. Lemmon, Univ. of Arizona Lunar and Planetary Laboratory.

The top half of this image is part of a series of images of a passing dust devil on Mars caught by Spirit. In the bottom half, the image has been filtered to remove everything that did not change from one image to the other. Notice the faint track left by the dust devil.

Martian Devils

by Dr. Tony Phillips

Admit it. Whenever you see a new picture of Mars beamed back by Spirit or Opportunity, you scan the rocks to check for things peeking out of the shadows. A pair of quivering green antennas, perhaps, or a little furry creature crouched on five legs…? Looking for Martians is such a guilty pleasure.

Well, you can imagine the thrill in 2004 when scientists were checking some of those pictures and they *did* see something leap out. It skittered across the rocky floor of Gusev Crater and quickly disappeared. But it wasn't a Martian; Spirit had photographed a dust devil! Dust devils are tornadoes of dust. On a planet like Mars which is literally covered with dust, and where it never rains, dust devils are an important form of weather. Some Martian dust devils grow almost as tall as Mt. Everest, and researchers suspect they're crackling with static electricity—a form of "Martian lightning." NASA is keen to learn more. How strong are the winds? Do dust devils carry a charge? When does "devil season" begin—and end? Astronauts are going to want to know the answers before they set foot on the red planet.

The problem is, these dusty twisters can be devilishly difficult to catch. Most images of Martian dust devils have been taken by accident, while the rovers were looking for other things. No more! The two rovers have just gotten a boost of artificial intelligence to help them recognize and photograph dust devils. It comes in the form of new software, uploaded in July and activated in September 2006. "This software is based on techniques developed and tested as part of the NASA New Millennium Program's Space Technology 6 project. Testing was done in Earth orbit onboard the EO-1 (Earth Observing-1) satellite," says Steve Chien, supervisor of JPL's Artificial Intelligence Group. Scientists using EO-1 data were especially interested in dynamic events such as volcanoes erupting or sea ice breaking apart. Chien and colleagues programmed the satellite to notice change. It worked: "We measured a 100-fold increase in science results for transient events."

Now that the techniques have been tested in Earth orbit, they are ready to help Spirit and Opportunity catch dust devils—or anything else that moves—on Mars. "If we saw Martians, that would be great," laughs Chien. Even scientists have their guilty pleasures.

Find out more about the Space Technology 6 "Autonomous Sciencecraft" technology experiment at *nmp.nasa.gov/st6/TECHNOLOGY/sciencecraft_tech.html*, and Mars Rover technology at *nmp.nasa.gov/TECHNOLOGY/infusion.html*.

—Article provided by JPL/NASA

NASA's Mars Global Surveyor May Be at Mission's End

NASA's Mars Global Surveyor has likely finished its operating career. The spacecraft has served the longest and been the most productive of any mission ever sent to the red planet.

"Mars Global Surveyor has surpassed all expectations," said Michael Meyer, NASA's lead scientist for Mars exploration at NASA Headquarters, Washington. "It has already been the most productive science mission to Mars, and it will yield more discoveries as the treasury of observations it has made continues to be analyzed for years to come." Its camera has returned more than 240,000 images to Earth.

The orbiter has not communicated with Earth since Nov. 2. Preliminary indications are that a solar panel became difficult to pivot, raising the possibility that the spacecraft may no longer be able to generate enough power to communicate. Engineers are also exploring other possible explanations for the radio silence.

"Realistically, we have run through the most likely possibilities for re-establishing communication, and we are facing the likelihood that the amazing flow of scientific observations from Mars Global Surveyor is over," said Fuk Li, Mars Exploration Program manager at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. "We are not giving up hope, though."

Efforts to regain contact with the spacecraft and determine what has happened to it will continue. NASA's newest Mars spacecraft, the Mars Reconnaissance Orbiter, pointed its cameras towards Mars Global Surveyor on Monday. "We have looked for Mars Global Surveyor with the star tracker, the context camera and the high-resolution camera on Mars Reconnaissance Orbiter," said Doug McCuistion, Mars Exploration Program director at NASA Headquarters. "Preliminary analysis of the images did not show any definitive sightings of a spacecraft."

The next possibility for learning more about Mars Global Surveyor's status is a plan to send it a command to use a transmitter that could be heard by one of NASA's Mars Exploration Rovers later this week.

Mars Global Surveyor launched on Nov. 7, 1996, and began orbiting Mars on Sept. 11, 1997. It pioneered the use of aerobraking at Mars, using careful dips into the atmosphere for friction to shrink a long elliptical orbit into a nearly circular one. The mission then started its primary mapping phase in April 1999. The original plan was to examine the planet for one Mars year, nearly two Earth years. Based on the value of the science returned by the spacecraft, NASA extended its mission four times.

"It is an extraordinary machine that has done things the designers never envisioned despite a broken wing, a failed gyro and a worn-out reaction wheel. The builders and operating staff can be proud

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of their legacy of scientific discoveries and key support for subsequent missions," said Tom Thorpe, project manager for Mars Global Surveyor at JPL.

The spacecraft evaluated landing sites for the twin NASA rovers that landed in 2004 and sites for future landings of the Phoenix and Mars Science Laboratory missions. It monitored atmospheric conditions during aerobraking by newer orbiters. It served as a relay link for the rovers and provided mapping information about their surroundings.

"When we watched the launch 10 years ago, we wondered if we would make the specified mission length. We certainly were not thinking of a 10-year operating life," said JPL retiree Glenn Cunningham, who managed the Global Surveyor project through development and launch.

A few of the mission's many important discoveries about Mars include:

— The spacecraft's camera found gullies cut into many slopes that have few, if any, impact craters. This indicates the gullies are geologically young. Scientists interpret this as evidence of action by liquid water, essentially in modern times.

— The mineral-mapping infrared spectrometer found concentrations of a mineral that often forms under wet conditions, fine-grained hematite. This discovery led to selection of a hematite-rich region as the landing site for NASA's Mars Exploration Rover Opportunity.

— Laser altimeter measurements have produced an unprecedented global topographic map of Mars. The instrument revealed a multitude of highly eroded or buried craters too subtle for previous observation, and mapped canyons within the polar ice caps.

— The magnetometer found localized remnant magnetic fields, indicating that Mars once had a global magnetic field like Earth's, shielding the surface from deadly cosmic rays.

— The camera found a fan-shaped area of interweaving, curved ridges interpreted as evidence of an ancient river delta resulting from persistent flow of water over an extended period in the planet's ancient past.

— A long life allowed Global Surveyor to track changes through repeated annual cycles. For three Martian summers in a row, deposits of carbon-dioxide ice near Mars' South Pole shrunk from the previous year's size, suggesting a climate change in progress.

JPL manages Mars Global Surveyor for the NASA Science Mission Directorate, Washington.

For more information on the mission, visit: *http://www.nasa.gov/mission_pages/mgs/index.html*

Sonoma County Astronomical Society
P.O. Box 183
Santa Rosa, CA 95402

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