

Sonoma Skies

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

July 2011

www.sonomaskies.org

Volume XXXIV No. 7

It's Time to Renew Your SCAS Membership

What an exciting time to be interested in Astronomy! New, ever larger telescopes, exploration by NASA and other space agencies around the world and research by talented scientist are providing new information every day about our wonderful universe.

Here in our small place in the Universe, the Sonoma County Astronomical Society is promoting a better understanding of the wonders of the universe in an increasing number of ways:

Monthly Meetings: Offer a wide array of expert speakers specializing in explaining astronomy to the general public .

Public Star Parties: Members share their enthusiasm for astronomy with school children and other local organizations. This is one of the most popular activities and gives seasoned veterans a chance to share their telescopes and knowledge with the public and new members get a chance to get hands-on information on the workings of telescopes and stargazing.

SCAS Newsletter: Our members receive *Sonoma Skies*, our Award Winning Newsletter providing up-to-date listings of local astronomy happenings and events, information important to Young Astronomers, observing highlights for the month and concise information on important astronomical research.

Social Gatherings: Our Annual Star B Que held each August at the Robert Ferguson Observatory open only to members and guests, as well as many other outings including a Yosemite Star Party.

Don't forget some of the other benefits: Membership in The Astronomical League and a subscription to their *Reflector* magazine; Discounted subscriptions for *Sky and Telescope* and *Astronomy* magazines; and access to the SCAS Library of astronomical related material.

So, now is the time not only to renew your membership but to invite your friends to become a part of the exciting field of astronomy by joining the Sonoma County Astronomical Society.

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My Summer Vacation with the Space Shuttle

SCAS July 13 Meeting, 7:30 PM
at Proctor Terrace School

Scott Granger just returned from a trip to Florida, where he toured the space shuttle launch facilities at the Kennedy Space Center. At our July meeting we are pleased to have Scott give us a "show and tell" about the Space Shuttle.

He plans on talking about his experience there, and showing a real life heat shield tile from the space shuttle. (Hopefully not one planned on being used for the final launch of Atlantis! And we're trusting he got it via legitimate means!)



The importance of the space shuttle's thermal protection system was made all to clear by the Columbia disaster of 2003. The tiles have unique and remarkable properties to deal with the extreme conditions of space flight; from the launch, orbital flight regime, and especially for re-entry into earth's atmosphere. We all know how critical they are, and how each subsequent mission has conducted a careful assay of the tiles' condition during orbital flight prior to that important return to earth.

Scott is a fifth grade teacher at Valley Vista Elementary School in Petaluma, where he lives with his wife and two sons. Each year he has been hosting a SCAS Star Party at the school, and considers it one of the highlights of his school year.

He brings his enthusiastic spirit and passion for the physical sciences to us, so be sure to come and get acquainted with him at our meeting Wednesday, July 18th, Proctor Terrace School. Maybe he'll let you touch a piece of the space shuttle!

—John Whitehouse, SCAS VP

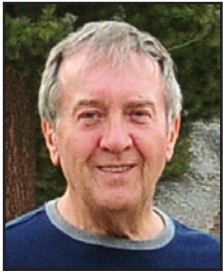


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President's Message

Greetings Fellow Amateur Astronomers, Summer, at last, and clear skies are finally beckoning us to come out to see and realize that there really are stars above the cloud tops! At the RFO, a few nights ago, I realized that I would have to relearn many of the constellations that were oh,

so familiar just a year ago. But, it is an endeavor that I eagerly look forward to.

Great news from the Astronomical League came my way on Sunday, June 5. Our outstanding Newsletter Editor, Cecelia Yarnell, had placed 'first' in their Mabel Sterns best newsletter contest. I managed to keep the news quiet until the SCAS met at the Petaluma Museum's 'Beyond' night on June 15, and after the exhibition tour had concluded I announced the good news. Cecelia will receive the official plaque at the SCAS's July 13th meeting. Plan to be there!



Photo by Len Nelson

The SCAS finally has an official 'Big Eye' scope to wow and please visitors at our public nights. Last year at June Ferguson's bidding, with Saws-All in hand, I 'disassembled' Bob Ferguson's 16" Dobsonian-mounted reflector that weighed about 250 pounds and which had suffered mightily from exposure to the elements.

The goal was to save the critical elements, the mirror and diagonal, for a metamorphosis into a new, revitalized and slimmer truss tube design that our master-of-all-things-engineering Larry McCune, promised he could deliver on. And so he has! The great 'unveiling' will occur at the July 13th meeting. Plan to be there to learn the story behind the scope and how the diagonal near its heart came to be.

Clear Skies,

—Len Nelson, SCAS President

Membership Renewal *(from page 1)*

To renew your annual membership, please print the membership form on the last page of this newsletter, and send it with a check payable to SCAS in the amount of \$25 to:

SCAS Membership
P.O. Box 183, Santa Rosa, CA 95402-1083.

This membership renewal period applies to all members. Don't miss a single benefit. Make sure you get your renewal check sent to us now. Thanks for being part of the Sonoma County Astronomical Society.

—Mike Dranginis, SCAS Membership Director

The James Webb Space Telescope – An Update

Mountain View's SETI Institute featured planetary astronomer Heidi B. Hammel [1], an interdisciplinary scientist from Washington, DC, who provided an update on the James Webb Space Telescope (JWST) on the evening of May 12, 2011.

What makes a Great Observatory?

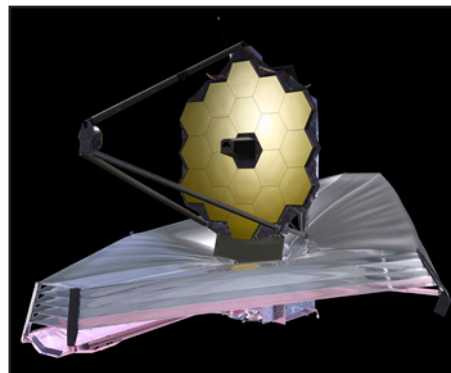
Hammel (b. 1960) posed the question, "What makes a great observatory?" She answered it by way of example, citing the incredible amount of science provided by the Hubble Space Telescope (HST) during its 21-year lifetime to date. These contributions translate into a daily average of 44 citations regarding Hubble science. Furthermore, 5,000 unique investigators from around the world have conducted their observations using Hubble. This is another great thing about HST: anyone can use the observatory after a proposal is accepted. This openness will be emulated by the JWST.

Why call it the James Webb Space Telescope?

James Webb was NASA's second administrator from 1961 to 1968. He was the architect of the successful Apollo program, which put the first human on the moon, and initiated the space science program, for which astronomers, such as Hammel, are most thankful. Webb ensured that NASA carried out a program of planetary exploration with the Mariner and Pioneer space programs. It is fitting that NASA, in 2002, designated the next generation space telescope as the James Webb Space Telescope.

What is it?

The James Webb Space Telescope is an infrared telescope that features a large mirror, 6.5 meters (21.3 feet) in diameter, made of ultra-lightweight beryllium optics, and a sunshield the size of a tennis court made of kapton. Both the mirror and sunshade won't fit onto the launch vehicle fully open, so both will fold up for the launch and be unfurled once in outer space. JWST is designed to operate for five years until its hydrazine propellant runs out.



JWST folded in rocket for launch (right), unfurled in space (above), graphics courtesy of NASA

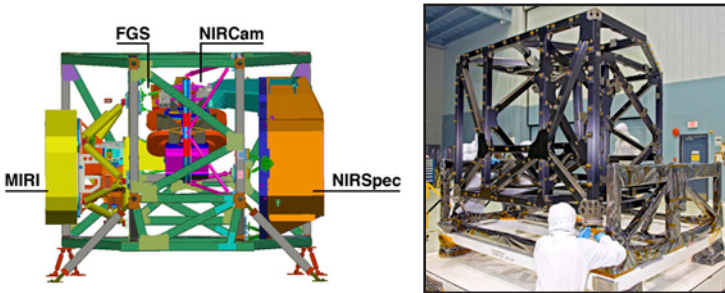
Fifteen countries are participating in the design of the infrared telescope. JWST will also support a number of instruments to conduct science. The Integrated Science Instrument Module, or

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James Webb Telescope *(from page 2)*

ISIM, is the heart of Hubble's successor. NASA says it is "like a chassis in a car providing support for the engine and other components." ISIM houses four main instruments, including the following:

1. Mid-Infrared Instrument, or MIRI, provided by the European Consortium with the European Space Agency, and by the NASA Jet Propulsion Laboratory,
2. Near-Infrared Camera, or NIRCam, provided by the University of Arizona
3. Near-Infrared Spectrograph, or NIRSpec, provided by ESA, with components provided by NASA/GSFC [3], and
4. Fine Guidance Sensor-Tunable Filter Imager, or FGS-TFI, provided by the Canadian Space Agency. The FGS contains a dedicated guider and a tunable filter imager.



ISIM (right) and graphic showing instrument location on ISIM, courtesy of NASA

Why Build It?

This next generation space telescope will replace both the HST optical telescope [4] and the Spitzer Infrared telescope [5]. JWST's objectives include the following [6]:

1. Find first light after the Big Bang and re-ionization,
2. Find how the first galaxies were assembled,
3. Study the birth of stars, and
4. Seek out the origins of life.

It is expected that JWST will find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way galaxy, and it will peer through dusty clouds to see stars forming planetary systems, connecting the Milky Way to our own Solar System.

The following table compares the three telescopes:

	Hubble	JWST	Spitzer
Mirror diameter	2.4 m	6.5 m	0.8 m
Operating temperature	270 degrees K	40 degrees K	5.5 degrees K
Wavelength	Optical to Near IR	Infrared	Infrared
Serviceable	YES, 5 missions	NO	NO

Where will it be placed?

After launch in 2015, the JWST will reside in an orbit 930,000 miles from Earth. This is known as the Lagrange 2 point, a place where the gravity of Earth cancels out the gravity of the Sun some 92 million miles further on. JWST will be lifted into orbit by the ESA's powerful Ariane 5 heavy rocket, likely from Kourou, French Guiana.

Cost Overruns

It's déjà vu. JWST, like its predecessor the HST, has gone way over budget, by \$1.5B. The \$5B lifecycle estimate is being revised upward to \$6.5B. The JWST Independent Comprehensive Review Panel report, issued in October 2010, revealed, "The

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The Astronomers
S-i-m-i-s-i-m-e-r
by Herb Larsen



Raccoons wash their food,
so why not their
telescopes?

SCAS cartoonist Herb Larsen can be contacted at hlarsenii@yahoo.com

SOCIAL AMENITIES

Many thanks to Ronald Tietz for providing refreshments at the June meeting.

DON'T FORGET TO RENEW YOUR SCAS MEMBERSHIP!

Support your local astronomy club! See Page 1.

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 Dickson Yeager, 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 <http://www.scopecity.com>

Events

ROBERT FERGUSON OBSERVATORY

Public Observing Night

Saturday, July 30

Solar Viewing: Noon - 4:00 PM

Night Viewing begins 9:00 PM

(Please arrive before 11:00 PM)

The Observatory features four telescopes: A 14-inch SCT with CCD camera in the East wing, an 8-inch refractor under the dome, a radio telescope for observing Sun activity, and a 24-inch reflector 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 \$8 per vehicle for entry. A \$3 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions.

Info: www.rfo.org

Night Sky Classes—Summer Series

May 31 June 7 June 28

July 26 Aug. 2 Aug. 23

Classes begin at 7:30 PM. Series of six sessions. Each class includes a lecture on the constellations of the season, their history and mythology, and how to find stars and deep sky objects within them. Includes observing.

Fees: \$75 for the series. (Single session fee is \$23). 10% discount for VMOA members. Classes are held at the Observatory. For information or to register: (707) 833-6979, [nightsky\(at\)rfo.org](mailto:nightsky(at)rfo.org)

RENT 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 around a week away from a Full Moon.

For information or to make a reservation, visit www.rfo.org or email George Loyer: [gloyer\(at\)rfo.org](mailto:gloyer(at)rfo.org).

MT. TAMALPAIS ASTRONOMY

July 9, 8:30 PM: “Nature’s Biggest Lenses”—Dr. Anja von der Linden, Stanford University

Gravitational lensing allows us to study dark matter, find exoplanets, and see the first objects in the universe.

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/>

THE SMITHSONIAN PRESENTS

“BEYOND”

VISIONS OF PLANETARY LANDSCAPES

at the Petaluma Museum through July 4

A Smithsonian Exhibit featuring 35 large-scale (ranging from 3 feet to 5 feet in width) framed prints containing 59 individual photographs, all digitally processed by artist Michael Benson. The exhibit paints a rarely seen and mesmerizing portrait of our solar system’s diverse worlds and their moons.

The exhibition is divided into several sections, including the Inner Solar System, Mars, Jupiter and Saturn. The show’s compositions include rare pictures of the sand dunes on Mars, storms on Neptune and the fiery eruptions of the sun.

In addition to Benson’s photography the exhibition will include a display of rare meteorites on loan from the California Academy of Science, memorabilia and artifacts concerning space exploration, an Astronomy night and speaker series including noted NASA representatives and scientists.

July 2nd, 3 PM: Nolan Gasser—“Cosmic Reflection: Musical Depictions of Physics and Cosmology”

Nolan Gasser is a critically acclaimed composer, pianist, and musicologist – most notably, the architect of Pandora Radio’s Music Genome Project. His original works have been performed in such prestigious venues as Carnegie Hall, the Kennedy Center, Alice Tully Hall, La Salle Pleyel (Paris), and the Rose Bowl (Pasadena), among many others.

SCAS and RFO astronomers provide outdoor public observing.

The film “The Dream is Alive” focusing on the Space Shuttle missions will be presented every Saturday at 1 PM.

Location: 240 4th Street, Petaluma, 707/778-4398
More info: www.petalumamuseum.com

MORRISON PLANETARIUM DEAN LECTURE SERIES

July 11, 7:30 PM: “Why Are There Stars?”—Dr. Steven W. Stahler, Dept. of Astronomy, University of California, Berkeley

Our galaxy, the Milky Way, contains one hundred billion stars and continues to form them today, some relatively near us. While nature clearly has no difficulty making these objects, astronomers have long struggled to understand this fundamental process. Stahler will describe the great strides we have made in understanding the process of star formation as a result of both improved observations and basic theoretical insights that have been developed in the past two decades. While mysteries remain, we now see how a star like our own Sun comes into existence.

Lectures sell out early, so reserve now. Call 800-794-7576 for reservations. Adults \$12, Seniors \$10, Members \$6. <http://www.calacademy.org/events/lectures/>

Events

Community Outreach Event Horizons

Summer Hiatus

School is out until mid-August, so there will be little SCAS public astronomy until then. We occasionally get requests for telescope volunteers from community service or private industry groups. If anything comes up, Lynn will be contacting those of you who are on his list of volunteers. If you have an interest in participating in public astronomy and are not already on that list, contact Lynn at [astroman\(at\)sonic.net](mailto:astroman(at)sonic.net) to receive email announcements about upcoming volunteer opportunities.

—Lynn Anderson, SCAS Director of Community Activities



Lynn Anderson, Loren Cooper preparing for a May school star party (despite ominous skies) at Austin Creek School. Photo by Eric Swanson, whose telescope is in the center.

SCAS YOSEMITE STAR PARTY August 19 and 20

The SCAS will provide public astronomy at Glacier Point and camp at the Bridal Veil group campground. All participants bring their own telescopes. Park entry and campground fees are a gift from the park for our service. Len Nelson ([lennelsn\(at\)comcast.net](mailto:lennelsn(at)comcast.net)) will coordinate the signups for this event. Let him know who you are, how many in your party and how many telescopes you will be bringing.

TAYLOR OBSERVATORY

Located in Kelseyville off Highway 29

July 9, Public Event, 8-11 PM: “The Why of the Universe”—Stephen Kane. Evening event includes lecture, planetarium show and telescope viewing. These events are held even in cloudy or rainy weather, although telescope viewing will not be possible. There is a suggested donation of \$3 per person. No reservation required. Info: 707/262-4121 or <http://www.taylorobservatory.org>

Astronomy Camps for several age groups are scheduled for July and August. Registration closes soon. Information: http://www.lake-coe.k12.ca.us/projects/102/Resources/Camps/2011_Astronomy_Camps.pdf

SETI INSTITUTE COLLOQUIUM

July 6 (Evening): “Moon Express - Pioneering the NewSpace Frontier”—Bob Richards, Moon Express, Inc

July 13: “Is there methane on Mars?”—Kevin Zahnle, Space Science Division, NASA Ames Research Center
Methane has been reported by several observers as a short-lived trace gas in the martian atmosphere. If verified, this would be an extraordinary result. Is the evidence for methane extraordinary? In this talk, Dr. Kevin Zahnle will discuss why one should remain skeptical of Methane on Mars.

July 20: “The Great Archean Bombardment, or the Late Late Heavy Bombardment”—Bill Bottke, Southwest Research Institute

The early bombardment history of the Inner Solar System is recorded in a number of interesting places (e.g., the surprisingly high abundance of highly siderophile abundances found in the Earth, Moon, and Mars, the observed impact basins found on Mercury, the Moon and Mars, various properties of main belt asteroids and meteorites, etc.). To date, two dominant scenarios have been used to explain these constraints: (i) most impacts came from the tail end of a monotonically-decreasing impactor population created by planet formation processes, and (ii) most impacts were produced by a terminal cataclysm that caused a spike in the impactor flux starting ~4.1 Gy ago. Interestingly, we find that both scenarios are needed to explain observations. For (i), we will show that leftover planetesimals were long-lived enough to hit various worlds long after the end of core formation. The record left behind can be used in interesting ways to probe the nature of terrestrial planet formation. For (ii), we will explore new applications of the so-called Nice model, which provides a plausible dynamical mechanism capable of creating a spike of comets/asteroid impactors.

Dr. Bottke will show that his results suggest that many “late heavy bombardment” impactors came from an unexpected source, and that they possibly continued to hit Earth, Venus, and Mars well after basin formation terminated on the Moon.

July 27: “Are we living in a multiverse? Eternal inflation, bubbles, and cosmic collisions”—Anthony Aguirre, Department of Physics and Santa Cruz Institute for Particle Physics, UC Santa Cruz

Colloquiums run from Noon to 1 PM on Wednesdays and at 7:30 PM one evening per month. Location: SETI Headquarters at 189 N. Bernardo Ave., Mountain View ([map](#)). Free. Lectures are available on YouTube at: <http://www.youtube.com/setiinstitute>

JANE’S “WHAT’S UP” PODCAST

Jane Houston Jones produces a monthly “What’s Up” podcast that features objects we can observe each month. Find Jane’s podcasts here: <http://solarsystem.nasa.gov/news/whatsup.cfm>

Young Astronomers



YA Summer Skies

Young Astronomers—are you looking for something interesting and challenging to do or find with your Sparks scope?

I am thinking about that too. What occurs to me is that few, if any of you, have ever witnessed the shadow transit of one or two of Jupiter's Galilean satellites across the face of Jupiter. I can tell you that it is a marvel to behold and I will be contacting you when these events are scheduled to happen in the coming months when Jupiter is once again in our evening sky.

Is there something that you would think would be super cool to do and share as a group? If so, let me know and I will assist you in assuring we do it soon.

YA at RFO: July has one public night at the RFO on Saturday, July 30th. The RFO will have a dedicated YA coordinator to assure that you fit comfortably in our 'small scope' telescope assembly and that you are assisted in finding and appreciating many celestial splendors.

Let me know if you have any questions and/or suggestions. I'd be pleased to hear from you.

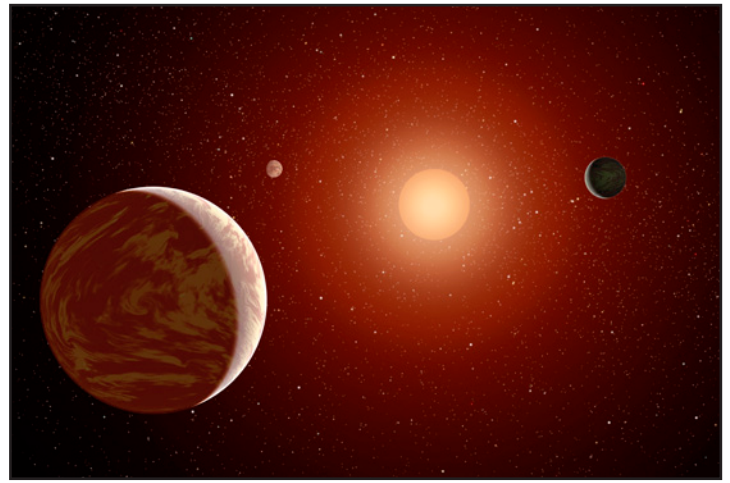
—Len Nelson, SCAS President

Greenhouse Gas Attack!



Greenhouse Gas Attack is a new game on The Space Place that gives everyone a chance to slow down global warming—at least in the digital world. Brightly colored blocks represent greenhouse gases. They allow sunlight in, but do not allow heat out. You wield a bouncing greenhouse-gas-blasting ball to knock out some of the gas blocks so that some of the heat can escape. If you do a good job, Earth's temperature stays in a healthy range. If you don't get rid of enough greenhouse gas blocks, Earth gets too hot and you lose.

Yellow "light balls" entering from the sky and red "heat balls" bouncing back from the ground demonstrate the greenhouse effect. This is one opportunity to get things under control! Check it out at <http://spaceplace.nasa.gov/greenhouse-gas-attack>.



Exoplanets are easier to see directly when their star is a dim, red dwarf

Finding Planets among the Stars

by Dr. Tony Phillips

Strange but true: When it comes to finding new extra-solar planets, or exoplanets, stars can be an incredible nuisance.

It's a matter of luminosity. Stars are bright, but their planets are not. Indeed, when an astronomer peers across light years to find a distant Earth-like world, what he often finds instead is an annoying glare. The light of the star itself makes the star's dim planetary system nearly impossible to see.

Talk about frustration! How would you like to be an astronomer who's constantly vexed by stars?

Fortunately, there may be a solution. It comes from NASA's Galaxy Evolution Explorer, an ultraviolet space telescope orbiting Earth since 2003. In a new study, researchers say the Galaxy Evolution Explorer is able to pinpoint dim stars that might not badly outshine their own planets.



"We've discovered a new technique of using ultraviolet light to search for young, low-mass stars near the Earth," said David Rodriguez, a graduate student of astronomy at UCLA, and the study's lead author. "These M-class stars, also known as red dwarfs, make excellent targets for future direct imaging of exoplanets."

Young red dwarfs produce a telltale glow in the ultraviolet part of the electromagnetic spectrum that Galaxy Evolution Explorer can sense. Because dwarf stars are so numerous—as a class, they account for more than two-thirds of the stars in the galaxy—astronomers could reap a rich bounty of targets.

In many ways, these stars represent a best-case scenario for planet hunting. They are close and in clear lines-of-sight, which generally makes viewing easier. Their low mass means they are dimmer than heavier stars, so their light is less likely to mask the feeble light of a planet. And because they are young, their planets are freshly formed, and thus warmer and brighter than older planetary bodies.

Astronomers know of more than five hundred distant planets, but very few have actually been seen. Many exoplanets are detected indirectly by means of their "wobbles"—the gravitational tugs

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Finding Planets *(from page 6)*

they exert on their central stars. Some are found when they transit the parent star, momentarily dimming the glare, but not dimming it enough to reveal the planet itself.

The new Galaxy Evolution Explorer technique might eventually lead to planets that can be seen directly. That would be good because, as Rodriguez points out, “seeing is believing.”

And it just might make astronomers feel a little better about the stars.

The Galaxy Evolution Explorer Web site at <http://www.galex.caltech.edu> describes many of the other discoveries and accomplishments of this mission. And for kids, how do astronomers know how far away a star or galaxy is? Play “How Old do I Look” on The Space Place at <http://spaceplace.nasa.gov/whats-older> and find out!

—Article provided by JPL/NASA

James Webb Telescope *(from page 3)*

problems causing cost growth and schedule delays on the JWST Project are associated with budgeting and program management, not technical performance. The technical performance on the Project has been commendable and often excellent. However, the budget baseline accepted at the Confirmation Review did not reflect the most probable cost with adequate reserves in each year of project execution. This resulted in a project that was simply not executable within the budgeted resources.”

An immediate quarter of a billion dollars is needed in 2011 to keep the project on track, an amount that is unlikely to be granted this year, considering the tough economic times. Instead, the program will likely slip beyond the planned 2015 launch date and reach an even higher cost plateau to complete, launch, and operate. This follow-on analysis won’t be completed until later in 2011.

To put this into perspective, however, Hammel indicated that the Hubble Space Telescope has cost \$10B over its lifetime [7]. Regardless of such comparisons, NASA may have all but killed most of the science planned for this decade. One industry expert suggested, “Even at the best case, the \$1.5 billion [increase] will virtually wipe out the inspirations of the newly released decadal survey in astrophysics for 2010-2020.”

From another perspective, enthusiasts believe the awesomeness of the JWST will prevail and it will ultimately find its place in the heavens, searching for the end of time. As Hank Green says, “We have to make good things happen.” Be sure to check out his video about the top 5 reasons to build the James Webb Space Telescope. “It is tense.”

—Submitted by R.K. Koslowsky, SCAS Member
<http://worldperspective.bravehost.com/astronomy.html>

Notes:

[1] Dr. Hammel is a senior research scientist and Co-Director of Research at the Space Science Institute in Boulder, Colorado, and an Interdisciplinary Scientist for the Hubble Space Telescope’s successor, the James Webb Space Telescope. She is also a member of the Science Working Group for the giant segmented mirror telescope. Additionally, she served on the

joint NASA/NSF Exoplanet Taskforce, and on the Science and Technology Definition Team for NASA’s Terrestrial planet Finder Coronagraph mission. Her main areas of interest are ground and space-based astronomical observations of outer planets’ atmospheres and satellites at visible and near infrared wavelengths utilizing adaptive optics technology. Because Uranus and Neptune are so cold, the JWST will be able to study these planets much better than the Hubble or other “warmer” telescopes. Please also see her 2007 Newsweek profile, Women and Leadership: <http://www.newsweek.com/2007/11/17/to-shoot-for-the-stars.html>.

[2] NASA’s website: <http://www.jwst.nasa.gov/>.

[3] NIRSpec features a new piece of technology, called the ‘microshutter array.’ To obtain 100 simultaneous spectra to increase the rate of data capture, micro-electromechanical system or MEMS technology is used. NIRSpec’s microshutter cells, each approximately as wide as a human hair, have lids that open and close when a magnetic field is applied. Each cell can be controlled individually, allowing it to be opened or closed to view or block a portion of the sky to be viewed. <http://www.jwst.nasa.gov/microshutters.html>

[4] Hubble: <http://hubble.nasa.gov/>

[5] Spitzer: http://www.nasa.gov/mission_pages/spitzer/main/index.html

[6] More on the rationale for building JWST: <http://www.jwst.nasa.gov/science.html>

[7] Hammel added that in 2010 dollars, Hubble cost \$4.7B to build and launch. Cost overruns could imperil other NASA programs and science work: <http://www.spacenews.com/civil/101112-jwst-cost-imperils-priority-projects.html>

[8] Hank Green, a booster of the JWST, puts his reasons for building JWST on YouTube: <http://www.youtube.com/watch?v=ihpNNBmJypE>. Warning: The F-bomb is used, or alluded to, several times, though in an enthusiastic context.

Reference:

[1] For more on the Hubble Space Telescope, please see the article, Seeing the Universe in a Mirror, R.K. Koslowsky, *Sonoma Skies* Newsletter, May 2011 issue. <http://www.sonomaskies.org/Newsletters.html>

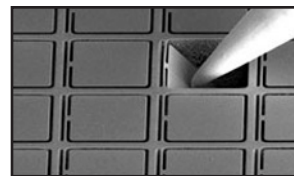


Image courtesy of NASA



SOFIA Successfully Observes Challenging Pluto Occultation

On June 23, NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) observed the dwarf planet Pluto as it passed in front of a distant star. This event, known as an "occultation," allowed scientific analysis of Pluto and its atmosphere by flying SOFIA at the right moment to an exact location where Pluto's shadow fell on Earth.

"This was the first demonstration in practice of one of SOFIA's major design capabilities," said Bob Meyer, SOFIA's program manager. "Pluto's shadow traveled at 53,000 mph across a mostly empty stretch of the Pacific Ocean. SOFIA flew more than 1,800 miles out over the Pacific Ocean from its base in Southern California to position itself in the center of the shadow's path, and was the only observatory capable of doing so."

SOFIA is a highly modified Boeing 747SP aircraft that carries a telescope with a 100-inch (2.5-meter) reflecting mirror that conducts astronomy research not possible with ground-based telescopes. By operating in the stratosphere at altitudes up to 45,000 feet, SOFIA can make observations above the water vapor in Earth's lower atmosphere.

"Occultations give us the ability to measure pressure, density, and temperature profiles of Pluto's atmosphere without leaving the Earth," said Ted Dunham of the Lowell Observatory in Flagstaff, Ariz., who led the team of scientists onboard SOFIA during the Pluto observations. "Because we were able to maneuver SOFIA so close to the center of the occultation we observed an extended, small, but distinct brightening near the middle of the occultation. This change will allow us to probe Pluto's atmosphere at lower altitudes than is usually possible with stellar occultations."

Dunham is the principal investigator for the High-Speed Imaging Photometer for Occultation (HIPO), essentially an extremely fast and accurate electronic light meter. He was a member of the group that originally discovered Pluto's atmosphere by observing a stellar occultation from SOFIA's predecessor, the Kuiper Airborne Observatory, in 1988. Pluto itself was discovered at Lowell Observatory in 1930.

A group of SOFIA German scientists and engineers were also aboard to monitor the performance of the German-built telescope and Fast Diagnostic Camera (FDC). That camera has been used on previous flights to measure the stability of SOFIA and its optical systems. On this flight, the FDC provided supplemental observations of the Pluto occultation.

There were some tense moments for SOFIA's international science team in the minutes leading up to Thursday's occultation. The precise position of Pluto in relation to Earth could not be

sufficiently refined until a few hours before the event. That evening, a Lowell astronomer used facilities at the U.S. Naval Observatory in Flagstaff to take multiple photographs of Pluto and the star. Those data were passed to collaborators at the Massachusetts Institute of Technology (MIT) in Cambridge, Mass., who refined their prediction of the exact position and timing of Pluto's shadow track.

About two hours before the occultation, the MIT group contacted SOFIA in-flight with the news that the center of the shadow would cross 125 miles north of the position on which the airborne observatory's flight plan had been based. After recalculating and filing a revised flight plan, SOFIA's flight crew and science team had to wait an anxious 20 minutes before receiving permission from air traffic control to alter the flight path accordingly.

"We have already shown that SOFIA is a first-rank international facility for infrared astronomy research. This successful occultation observation adds substantially to SOFIA's ability to serve the world's scientific community," said Pamela Marcum, SOFIA project scientist. For more information about SOFIA, visit: <http://www.nasa.gov/sofia>



The German-built 100-inch telescope that is the heart of NASA's Stratospheric Observatory for Infrared Astronomy is nestled in the SOFIA 747's rear fuselage. (Photo courtesy of L-3 Communications)

Saturn's moon may have salty, Earthlike ocean

by Bas den Hond, Cosmos Online

The source of mysterious ice plumes that emanate from Saturn's moon Enceladus is very likely an ocean, according to a new study. And in one important respect this ocean is similar to those on Earth: the water is salty.

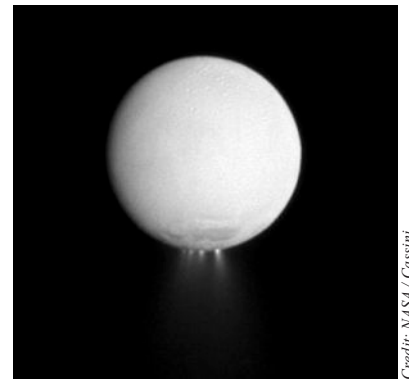
The plumes were discovered in 2005 by the space probe Cassini, which has been criss-crossing the Saturn system since 2004. An instrument on board Cassini can measure the composition of small particles that crash into a metal plate mounted on the space probe.

Publishing in the current issue of *Nature*, astrophysicist Frank Postberg from the University of Heidelberg in Germany, used this to determine the composition of the ice particles in the plumes during three flybys of Enceladus, at different distances.

Postberg's results show that the ice contains salts, mostly the regular table salt sodium chloride and also some sodium bicarbonate and potassium salts.

He found that the ice that was intercepted closer to the surface of the moon was saltier than ice further out, as these heavier particles tend to be slower.

Light, salt-poor particles, in contrast, easily escape the gravitational pull of Enceladus and feed the so-called 'E-ring' of Saturn. Read more at <http://www.cosmosmagazine.com/>.



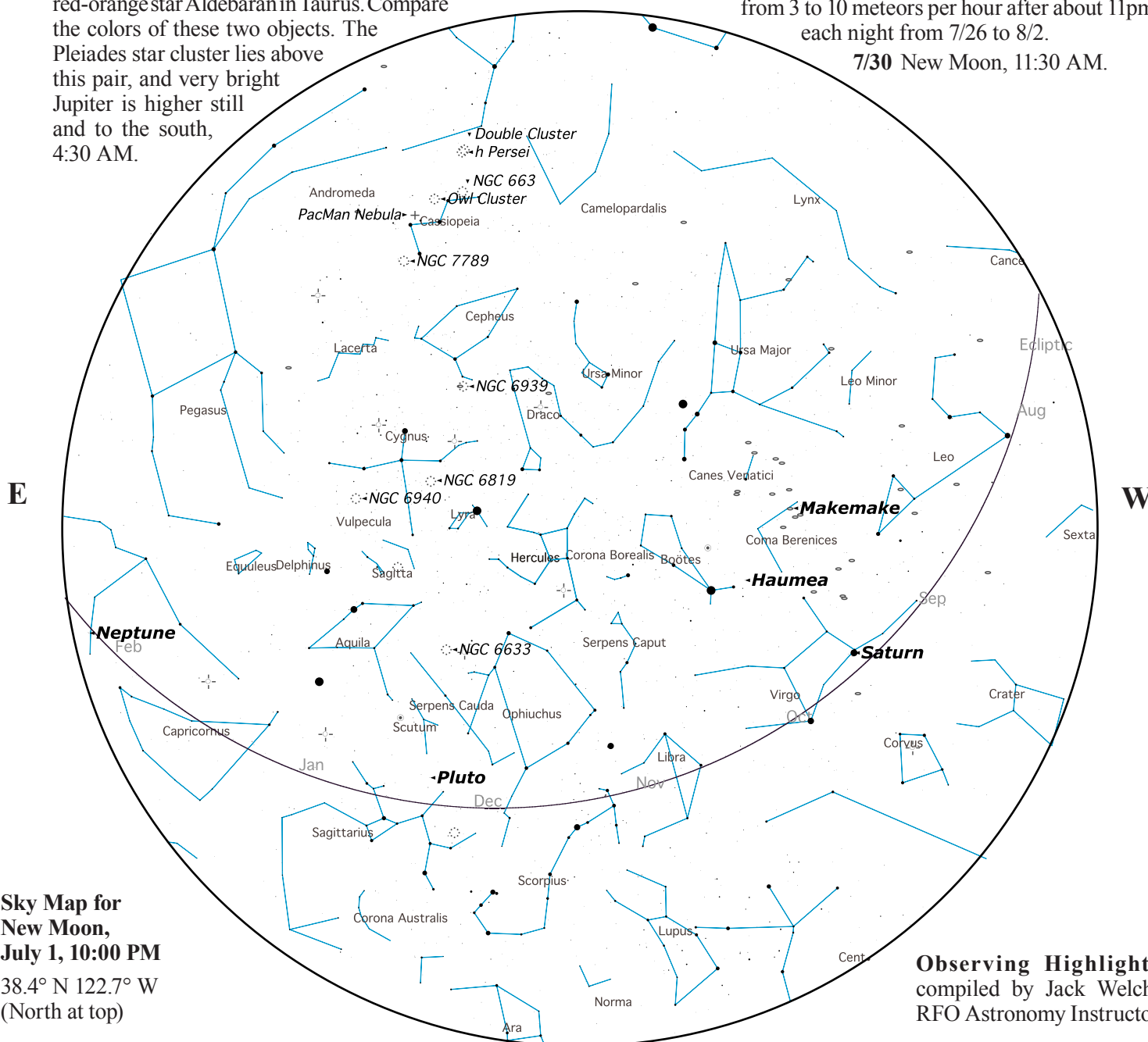
Photograph of Saturn's moon Enceladus as seen by NASA's Cassini Equinox spacecraft. The 503 km-wide moon is venting water ice from its south pole, generating four defined plumes.

Credit: NASA / Cassini

July 2011 Observing Highlights

- 7/1 New Moon, 2 AM.
Mercury in West through 7/28. Mercury provides its best evening apparition of the year. Look for it 30 minutes after sunset (or shortly after 9:00pm). It is brightest early in this period and fades quickly starting around 7/20. Low to the horizon at the start, it climbs quickly each night reaching maximum altitude on 7/8 (about 10° 30 minutes after sunset).
- 7/2 4% Crescent Moon below and slightly south of Mercury. Look between 9:00 and 9:15 as the moon is low and sets quickly.
- 7/3 Crescent Moon south of Mercury, 9 PM.
- 7/4 Crescent Moon below and south of the bright blue star Regulus in Leo, 10 PM.
- 7/6 Orange-red Mars is above and north of the slightly brighter red-orange star Aldebaran in Taurus. Compare the colors of these two objects. The Pleiades star cluster lies above this pair, and very bright Jupiter is higher still and to the south, 4:30 AM.






- 7/6 Mercury hovers near the Beehive star cluster M44 during the first week of July, with nearest approach this evening. Use large binoculars to try to spot the brightest cluster stars through the twilight glow, 9 PM.
- 7/7 Moon near Saturn.
- 7/8 Moon near Spica in Virgo, 10 PM.
- 7/10 Uranus stationary, begins retrograde motion in Pisces.
- 7/12 Neptune's Birthday! This afternoon at 3:30, Neptune completes one full orbit around the sun since its discovery on September 23, 1846. RFO will celebrate this event at our public observing night on 8/27.
- 7/19 Mercury at greatest elongation East, 10 PM.
- 7/24 Moon near Jupiter, 2 AM.
- 7/27 Crescent Moon very near Mars, 4 AM.
- 7/29 The South delta-Aquarid Meteor shower should provide from 3 to 10 meteors per hour after about 11pm each night from 7/26 to 8/2.
- 7/30 New Moon, 11:30 AM.



**Sky Map for
New Moon,
July 1, 10:00 PM**
38.4° N 122.7° W
(North at top)

Observing Highlights
compiled by Jack Welch,
RFO Astronomy Instructor

July 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					 1	2
					Mercury in West through 7/28	4% Crescent Moon near Mercury
3	4	5	6	 7	8	9
Crescent Moon south of Mercury	Crescent Moon south of Regulus		Mars near Aldebaran; Mercury near M4	Moon near Saturn	Moon near Spica	
10	11	12	13	 14	15	16
Uranus Stationary		Neptune's Birthday	SCAS Meeting 7:30 PM			
17	18	19	20	21	 22	23
		Mercury at greatest elongation east				
24	25	26	27	28	29	 30
Moon near Jupiter		RFO Night Sky Class 7:30 PM				RFO Pubic Observing Solar: Noon-4 Night: 9PM >
31	Crescent Moon very near Mars				S. Delta-Aquarid Meteor Shower	

See Page 4 for more detailed information on events.

SCAS Membership Application/Renewal

Annual Membership dues are \$25 due June 1.
(New members joining after Nov. 30 pay \$12.50)

Please complete this form and give to the Membership Director or a Board member with your check, payable to "SCAS," at the next meeting, or mail your dues to: SCAS, P.O. Box 183, Santa Rosa, CA 95402-0183.

New Renewal Family (no extra charge)

Name(s): _____

Email: _____
(Required for *Sonoma Skies*)

Address: _____

City/State/Zip: _____

Telephone: _____

I am interested in serving in one or more of these areas:

- School Star Parties SCAS Board
 Newsletter Striking Sparks
 Mentoring Young Astronomers
 Yosemite Star Party Other _____

New Members please note interests and hobbies you would like us to know about:

New Members please share your reason(s) for joining SCAS, and how you heard about the club:

Your dues include our monthly newsletter *Sonoma Skies*, membership in the Astronomical League and its *Reflector* magazine, discounted subscriptions for *Sky and Telescope* and *Astronomy* magazines, great guest speakers at our monthly meetings, the annual Star-B-Que, and opportunities to meet new and interesting people who share your passion for the night sky and many aspects of astronomy and science.

Welcome to the SCAS!

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 Keith Payea at kpayea@bryantlabs.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@yahoo.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 7 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

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www.sonomaskies.org