

# Southwest Florida Astronomical Society

## SWFAS



## The Eyepiece April 2011

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### A MESSAGE FROM THE PRESIDENT

April's here, no foolin'. We had a great Rotary Park Star Party and I want to thank everyone who came out and assisted. I also did some solar observing with Gulf Elementary 3rd Grade (7 classrooms) and went to the Lee County Parks and Rec Volunteer Brunch where I did some solar observing with them. I even got Commissioner Judah to look at the sun. Many of the P&R staff were present and if people are interested in doing volunteer work they are always interested. They have summer camps coming that they would like us to do some programs/events for.

Chick-fil-A at Pine Island Rd is interested in doing an astronomy-based kids night in July. This is a popular event they do at all the different Chick-fil-As in Lee County. This may be a good PR situation too.

This month we have another Hickey's Creek night on April 1st, followed by a CRP star party on the 2nd.

Astronomy Day is May 7th. What shall we do for it?

Our Meeting is April 7th at 7:30 at the Calusa Nature Center Planetarium. Dennis Albright will be talking about the 4 Gas Giant planets, Jupiter, Saturn, Uranus and Neptune, and their moons and whether they are failed stars.

We will be updating our membership list to the Astronomical League by April 15, so please make sure that your dues are paid! Dues are \$20 for the year, and can be paid at our monthly meetings or mailed to our post office box, i.e. Southwest Florida Astronomical Society, Inc., PO Box 100127, Cape Coral, Florida 33910. Your continued support is greatly appreciated. If you have a question as to whether you have paid your 2011 dues already as some members have, please contact our Treasurer Stewart Rorer. If you have not renewed by my records, you will be getting an email from me.

As of the writing of this, our website is still being overhauled. Hopefully it will be up before the meeting. Meeting agendas will now only be sent out by email. We had only a few who were getting it mailed to them, and this often was not arriving in time or they were not attending meetings. I try to cover major topics in the newsletter that will be brought up at the meetings.

## President's Message Continues...

If anyone wants a SWFAS shirt/hat, they can be ordered at any time. The cost for the shirt is \$24 and the hat is \$6. Payment should be made by check payable to SWFAS and given to our Treasurer, Stewart Rorer.

The sky this month:

Saturn starts this month at opposition. This makes it well placed for observation.

Venus is still shining bright in the morning sky.

The full moon is on the 18th.

Lyrid Meteor Shower April 21/22 (Moon may wash this shower out)

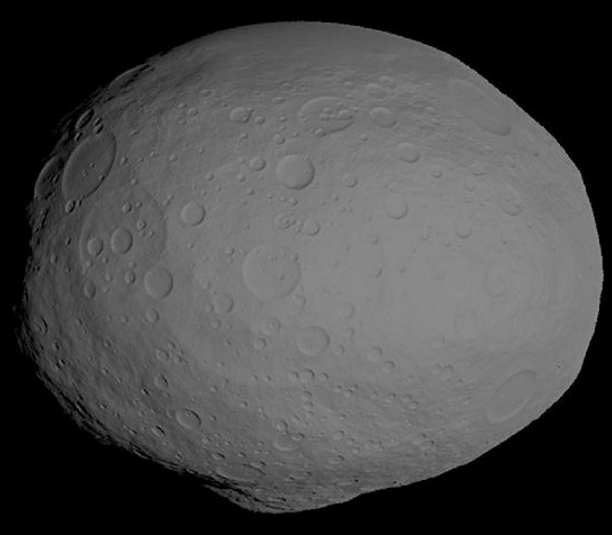
## April Meeting

Our monthly meeting is on April 7th at 7:30pm at the Calusa Nature Center Planetarium. Dennis Albright will be talking about the 4 Gas Giant planets: Jupiter, Saturn, Uranus and Neptune, and their moons and whether they are failed stars.

## Vesta-Is it Really an Asteroid?

On March 29, 1807, German astronomer Heinrich Wilhelm Olbers spotted Vesta as a pinprick of light in the sky. Two hundred and four years later, as NASA's Dawn spacecraft prepares to begin orbiting this intriguing world, scientists now know how special this world is, even if there has been some debate on how to classify it.

Many astronomers call Vesta an asteroid because it lies in the main asteroid belt between Mars and Jupiter. But Vesta is not a typical member of that orbiting rubble patch. The vast majority of objects in the main belt are lightweights, 100 kilometers wide or smaller, compared with Vesta, which is a 530 kilometer-wide behemoth.



"I don't think Vesta should be called an asteroid," said Tom McCord, a Dawn co-investigator. "Not only is Vesta so much larger, but it's an evolved object, unlike most things we call asteroids."

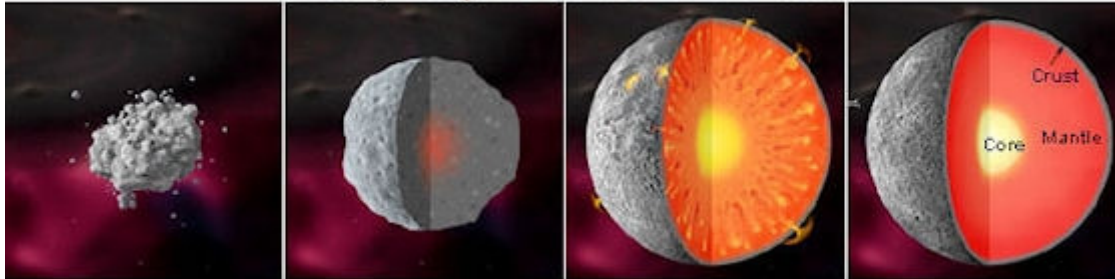
**Left:** A model of the protoplanet Vesta, using scientists' best guess to date of what the surface of the protoplanet might look like. It was created as part of an exercise for NASA's Dawn mission.

The layered structure of Vesta (core, mantle and crust) is the key trait that makes Vesta more like planets such as Earth, Venus and Mars than the other asteroids, McCord said. Like the planets, Vesta had sufficient radioactive material inside when it coalesced, releasing heat that melted rock and enabled lighter layers to float to the outside. Scientists call this process differentiation. McCord and colleagues were the first to discover that Vesta was likely differentiated when special detectors on their telescopes in 1972 picked up the signature of basalt. That meant that the body had to have melted at one time.

Officially, Vesta is a "minor planet" - a body that orbits the sun but is not a proper planet or comet. But there are more than 540,000 minor planets in our solar system, so the label doesn't give Vesta much distinction. Dwarf planets, which include Dawn's second destination, Ceres, are another category, but Vesta doesn't qualify as one of those. For one thing, Vesta isn't quite large enough.

Dawn scientists prefer to think of Vesta as a protoplanet because it is a dense, layered body that orbits the sun and began in the same fashion as Mercury, Venus, Earth and Mars, but somehow never fully developed. In the swinging early history of the solar system, objects became planets by merging with other Vesta-sized objects. But Vesta never found a partner during the big dance, and the critical time passed. It may have had to do with the nearby presence of Jupiter, the neighborhood's gravitational superpower, disturbing the orbits of objects and hogging the dance partners.

### *A Rocky Body Forms and Differentiates*



(From Smithsonian National Museum of Natural History - [http://www.mnh.si.edu/earth/text/5\\_1\\_4\\_0.html](http://www.mnh.si.edu/earth/text/5_1_4_0.html))

Other space rocks have collided with Vesta and knocked off bits of it. Those became debris in the asteroid belt known as Vestoids, and even hundreds of meteorites that have ended up on Earth. But Vesta never collided with something of sufficient size to disrupt it, and it remained intact. As a result, Vesta is a time capsule from that earlier era.

"This gritty little protoplanet has survived bombardment in the asteroid belt for over 4.5 billion years, making its surface possibly the oldest planetary surface in the solar system," said Christopher Russell, Dawn's principal investigator. "Studying Vesta will enable us to write a much better history of the solar system's turbulent youth."

- Editor: Dr. Tony Phillips, Credit: Science@NASA , [http://science.nasa.gov/science-news/science-at-nasa/2011/29mar\\_vesta/](http://science.nasa.gov/science-news/science-at-nasa/2011/29mar_vesta/)

## **Stunning images of Mercury**

As you may recall, Mercury is the closest planet to the Sun. That makes it extremely hot. Getting a good look at it isn't easy. Well, NASA's Messenger spacecraft is changing that. On March 17, it started orbiting Mercury. Now it's sending back some amazing pictures. You can see these first pictures on NASA's site. More will be posted as NASA receives them. Continuous global mapping of Mercury begins on April 4. The site also tells you more about the mission. You can learn about the Messenger spacecraft. Plus, you can learn more about the overall mission.

"The entire MESSENGER team is thrilled that spacecraft and instrument checkout has been proceeding according to plan," says MESSENGER Principal Investigator Sean Solomon. "The first images from orbit and the first measurements from MESSENGER's other payload instruments are only the opening trickle of the flood of new information that we can expect over the coming year. The orbital exploration of the Solar System's innermost planet has begun."

- [http://www.nasa.gov/mission\\_pages/messenger/main/index.html](http://www.nasa.gov/mission_pages/messenger/main/index.html)

## **From NASA's Planetary Science Forum, FYI...**

Hello Friends-of-the-Year-of-the-Solar-System! Please share this message far and wide with your colleagues, audiences, social media avenues, list-servs, and partners! Many thanks! April's topic for NASA's Year of the Solar System (YSS) – Water, Water Everywhere: Celebrating Earth Day!

Planetary scientists once thought Earth was an oasis in a dry solar system, as early missions to our neighbors revealed desert-like conditions on the Moon, Mars, and Mercury. Missions in

recent years have overturned this view, returning mounting evidence of ample water from a vast array of locations.

Comets from the remote corners of our solar system are made of water and other ices. Orbiters, landers, and rovers reveal Mars as a watery world in the distant past - a world that today may contain entire underground oceans of frozen water. The Moon, once thought dry-as-a-bone, has a water cycle-with small amounts of water moving across its surface-and voluminous quantities of water ice locked into frozen crater floors at its poles. Rings of ice orbit the gas giants, and several moons of these distant worlds have immense oceans of liquid water beneath their frozen crusts. Even Mercury has ice in the dark craters at its poles, as revealed by the ongoing MESSENGER mission.

Water is critical to life and to future human forays into space. While we now know that Earth is not the only place with water, it is the only oasis that contains life. As we celebrate Earth Day 2011, we should remember to take care of our water resources on our home planet, even as we are discovering water almost everywhere in our solar system!

Join us this month as we celebrate Earth Day (<http://www.earthday.org/earth-day-2011>)! Share with NASA how you and your family help our planet (<http://www.nasa.gov/externalflash/earthday/>). And don't forget to join the world space party and celebrate Yuri's Night (<http://www.yurisnight.net/>), which marks the first time a human orbited Earth.

Visit the YSS website (<http://solarsystem.nasa.gov/yss/display.cfm?Year=2011&Month=4>) to find activities for classroom and informal learning environments, night-sky viewing events and mission milestones, recommended resources, and downloadable materials connected to this month's theme of Water, Water Everywhere!

Ideas? Feedback? Contact us! [planetaryforum@lpi.usra.edu](mailto:planetaryforum@lpi.usra.edu)  
- *Andrew Fraknoi*

## **Spring is Fireball Season**

What are the signs of spring? They are as familiar as a blooming daffodil, a songbird at dawn, a surprising shaft of warmth from the afternoon sun.

And, oh yes, don't forget the meteors.

"Spring is fireball season," says Bill Cooke of NASA's Meteoroid Environment Center. "For reasons we don't fully understand, the rate of bright meteors climbs during the weeks around the vernal equinox."

In other seasons, a person willing to watch the sky from dusk to dawn could expect to see around 10 random or "sporadic" fireballs. A fireball is a meteor brighter than the planet Venus. Earth is bombarded by them as our planet plows through the jetsam and flotsam of space--i.e., fragments of broken asteroids and decaying comets that litter the inner solar system.

In spring, fireballs are more abundant. Their nightly rate mysteriously climbs 10% to 30%. "We've known about this phenomenon for more than 30 years," says Cooke. "It's not only fireballs that are affected. Meteorite falls-space rocks that actually hit the ground--are more common in spring as well."



Researchers who study Earth's meteoroid environment have never come up with a satisfactory explanation for the extra fireballs. In fact, the more they think about it, the stranger it gets.

**Left:** A NASA fireball camera at the Marshall Space Flight Center.

There is a point in the heavens called the "apex of Earth's way." It is, simply, the direction our planet is traveling. As Earth circles the sun, the apex circles the heavens, completing one trip through the Zodiac every year.

The apex is significant because it is where sporadic meteors are supposed to come from. If Earth were a car, the apex would be the front windshield. When a car drives down a country road, insects accumulate on the glass up front. Ditto for meteoroids swept up by

Earth.

Every autumn, the apex climbs to its highest point in the night sky. At that time, sporadic meteors of ordinary brightness are seen in abundance, sometimes dozens per night. Read that again: *Every autumn*.

"Autumn is the season for sporadic meteors," says Cooke. "So why are the sporadic fireballs peaking in spring? That is the mystery."

Meteoroid expert Peter Brown of the University of Western Ontario notes that "some researchers think there might be an intrinsic variation in the meteoroid population along Earth's orbit, with a peak in big fireball-producing debris around spring and early summer. We probably won't know the answer until we learn more about their orbits."

To solve this and other puzzles, Cooke is setting up a network of smart meteor cameras around the country to photograph fireballs and triangulate their orbits. He's looking for places to put his cameras; educators are encouraged to get involved. Networked observations of spring fireballs could ultimately reveal their origin.

"It might take a few years to collect enough data," he cautions.

Until then, it's a beautiful mystery. Go out and enjoy the night sky. It *is* spring, after all.

- Author: Dr. Tony Phillips, Credit: Science@NASA , [http://science.nasa.gov/science-news/science-at-nasa/2011/31mar\\_springfireballs/](http://science.nasa.gov/science-news/science-at-nasa/2011/31mar_springfireballs/)

## **New Science@NASA Podcast**

The Science@NASA team is pleased to announce a new product: the ScienceCast.

Every week, we produce a short video highlighting a topic in breaking science news. This week's episode is "The Superfluid Core of a Dead Star." See it on Youtube:

- <http://www.youtube.com/user/ScienceAtNASA>

## **Scale of the Universe Depiction**

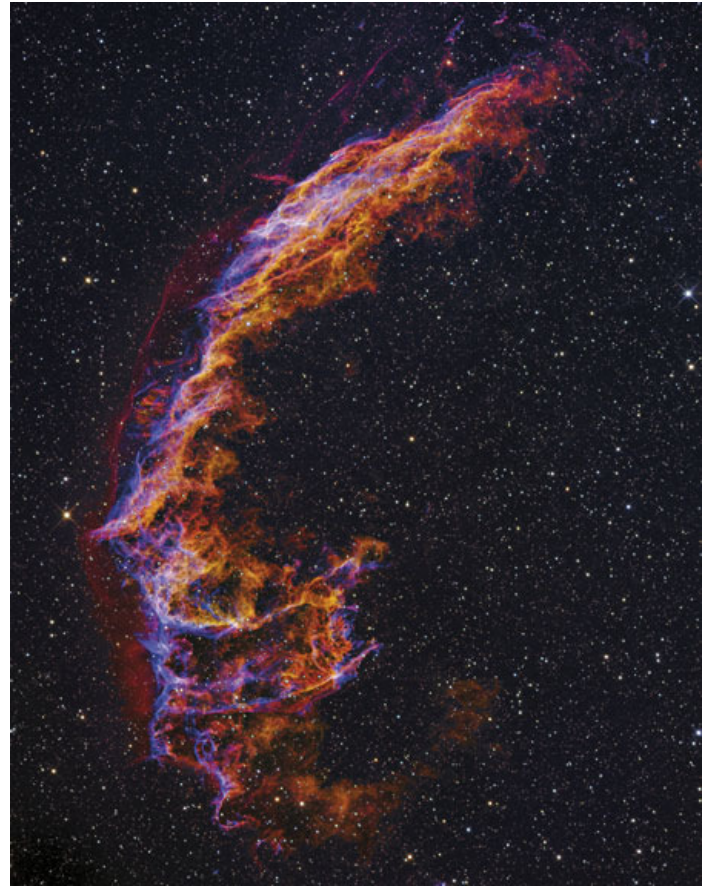
Check out this fun depiction of the scale of the Universe:

- <http://www.newgrounds.com/portal/view/525347>

## The Veil Unveiled

Some five to eight thousand years ago, a star exploded in the constellation Cygnus. We don't know how bright the star was, how long it was visible, or what impact its appearance had on those humans who witnessed it. We do know that the supernova created an energetic shock wave that has expanded, causing the interstellar medium it comes in contact with to glow. A compact circular nebula likely formed right after the explosion, but thousands of years of expansion have turned it into a diffuse, sprawling remnant that now covers an area six times the width of the full Moon. The Veil Nebula, as it is known today, is so diffuse that its isolated components are each given a different designation. Shown here is NGC 6992, also known as the Eastern Veil, one of the largest intact portions of the nebula. This incredible image of the Veil Nebula was taken by astrophotographer Antonio Fernandez ([www.afernandez.net](http://www.afernandez.net)). Treat yourself to more of Antonio's wonderful work at [www.astrosurf.com/afernandez](http://www.astrosurf.com/afernandez). To learn more about the fascinating Veil Nebula, watch this short but very informative Hubblecast video (<http://www.youtube.com/watch?v=13CbxiQLig>). It's an excellent summary of the life cycle of stars.

- *Year in Space newsletter*



## Forensic Sleuthing Ties Ring Ripples to Impacts

Like forensic scientists examining fingerprints at a cosmic crime scene, scientists working with data from the Cassini, Galileo and New Horizons missions have traced telltale ripples in the rings of Saturn and Jupiter back to collisions with cometary fragments dating back more than 10 years ago.

The ripple-producing culprit in the case of Jupiter was comet Shoemaker-Levy 9, whose debris cloud hurtled through the thin Jupiter ring system during a kamikaze course into the planet in July 1994. Scientists attribute Saturn's ripples to a similar object – likely another cloud of comet debris - plunging through the inner rings in the second half of 1983.

"What's cool is we're finding evidence that a planet's rings can be affected by specific, traceable events that happened in the last 30 years, rather than a hundred million years ago," said Matthew Hedman of the Cassini imaging team. "The solar system is a much more dynamic place than we gave it credit for."

From Galileo's visit to Jupiter, scientists have known since the late 1990s about patchy patterns in the Jovian ring. But the Galileo images were a little fuzzy, and scientists didn't understand why such patterns would occur. The trail was cold until Cassini entered orbit around Saturn in 2004 and started sending back thousands of images. A 2007 paper by Hedman and colleagues first noted corrugations in Saturn's innermost ring, dubbed the D ring.

A group including Hedman and Mark Showalter, a Cassini co-investigator, then realized that the grooves in the D ring appeared to wind together more tightly over time. Playing the process

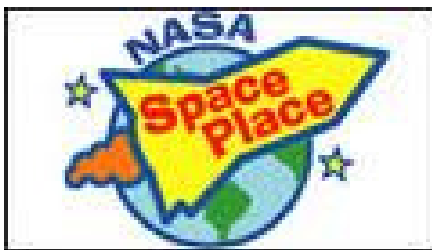
backward, Hedman then demonstrated the pattern originated when something tilted the D ring off its axis by about 300 feet in late 1983. The scientists found the influence of Saturn's gravity on the tilted area warped the ring into a tightening spiral.

Cassini imaging scientists got another clue when the sun shone directly along Saturn's equator and lit the rings edge-on in August 2009. The unique lighting conditions highlighted ripples not previously seen in another part of the ring system. Whatever happened in 1983 was not a small, localized event; it was big. The collision had tilted a region more than 12,000 miles wide, covering part of the D ring and the next outermost ring, the C ring. Unfortunately spacecraft were not visiting Saturn at that time and the planet was on the far side of the sun, hidden from Earth-bound telescopes, so whatever happened in 1983 passed unnoticed by astronomers. Hedman and Showalter began to wonder whether the long-forgotten pattern in Jupiter's ring system might illuminate the mystery. Using Galileo images, Showalter confirmed a similar winding spiral pattern. They applied the same math they had applied to Saturn – but now with Jupiter's gravitational influence factored in. Unwinding the spiral pinpointed the date when Jupiter's ring was tilted off its axis: between June and September 1994. Shoemaker-Levy plunged into the Jovian atmosphere during late July 1994. The estimated size of the nucleus was also consistent with the amount of material needed to disturb Jupiter's ring.

The Galileo images also revealed a second spiral, which was calculated to have originated in 1990. Images taken by New Horizons in 2007, when the spacecraft flew by Jupiter on its way to Pluto, showed two newer ripple patterns, in addition to the fading echo of the Shoemaker-Levy impact.

We now know that collisions into the rings are very common – a few times per decade for Jupiter and a few times per century for Saturn," Showalter said. "Now scientists know that the rings record these impacts like grooves in a vinyl record, and we can play back their history later." The ripples also give scientists clues to the size of the clouds of cometary debris that hit the rings. In each of these cases, the nuclei of the comets – before they likely broke apart – were a few kilometers wide.

- [http://www.jpl.nasa.gov/news/news.cfm?release=2011-102&cid=release\\_2011-102](http://www.jpl.nasa.gov/news/news.cfm?release=2011-102&cid=release_2011-102)



## The Space Place GOES-R, Zombie Fighter

by Dr. Tony Phillips

On April 5, 2010, something eerie happened to the Galaxy 15 telecommunications satellite: It turned into a zombie.

The day began as usual, with industry-owned Galaxy 15 relaying TV signals to millions of viewers in North America, when suddenly the geosynchronous satellite stopped taking commands from Earth. It was brain dead! Like any good zombie, however, its body continued to function. Within days, Galaxy 15 began to meander among other satellites in geosynchronous orbit, transmitting its own signal on top of the others'. Satellite operators scrambled to deal with the interference, all the while wondering what happened?



**Left:** The Galaxy 15 communication satellite was "brainless" for several months in 2010 after

*being exposed to a geomagnetic storm. The new GOES-R satellite will warn of such dangers.*

In horror movies, zombies are usually produced by viruses.

"In this case, the culprit was probably the sun," says Bill Denig of the National Geophysical Data Center. He and colleague Janet Green of NOAA's Space Weather Prediction Center recently led a study of the Galaxy 15 anomaly, and here are their conclusions:

On April 3rd, a relatively minor solar flare launched a cloud of plasma toward Earth. Galaxy 15 had experienced many such events before, but this time there was a difference.

"Galaxy 15 was just emerging from the shadow of Earth when the cloud arrived and triggered a geomagnetic storm," explains Denig. Suddenly exposed to sunlight and the ongoing storm, "the spacecraft began to heat up and charge [up]."

Electrons swirling around Galaxy 15 stuck to and penetrated the spacecraft's surface. As more and more charged particles accumulated, voltages began to rise, and—zap!—an electrostatic discharge occurred. A zombie was born.

"At least, this is what we suspect happened based on data collected by GOES satellites in the vicinity," he says. "We'll be able to diagnose events like this much better, however, after GOES-R is launched by NASA in 2015."

GOES-R is NOAA's next-generation Geostationary Operational Environmental Satellite. One of the instruments it will carry, a low-energy electron counter, is crucial to "zombie fighting." Low energy-electrons are the ones most likely to stick to a spacecraft's surface and cause brain-frying discharges. By monitoring these particles in Earth orbit, GOES-R will provide better post-mortems for future zombie outbreaks. This could help satellite designers figure out how to build spacecraft less susceptible to discharges. Also, GOES-R will be able to issue alerts when dangerous electrons appear. Satellite operators could then take protective action—for example, putting their birds in "safe mode"—to keep the zombie population at bay.

Meanwhile, Galaxy 15 is a zombie no more. In late December 2010, after 9 months of terrorizing nearby spacecraft, the comsat was re-booted, and began responding to commands from Earth again.

All's well that ends well? True zombie fighters know better than to relax. Says Denig, "we're looking forward to GOES-R."

You and the kids in your life can learn about space weather at <http://scijinks.gov/space-weather-and-us>.

*- This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



### **Will you be a Spring Quarterly Meteorite Winner?**

Log your Events held during the first quarter of 2011 by April 10, 2011. We will pick five clubs randomly from the logged NSN events held between January 1st and March 31st. The more events you log using NSN resources, the better your chances of winning. Drawing will be held on Monday, April 11, 2011. Here are the details: [http://nightsky.jpl.nasa.gov/club/news-display.cfm?News\\_ID=417](http://nightsky.jpl.nasa.gov/club/news-display.cfm?News_ID=417)

For those clubs that have not yet received all the ToolKits, remember you just need to log two events in the previous quarter to qualify for your next Toolkit. Get your events logged by the 10th of April to qualify.

### **Second Chance to Win a Kit and Meter!**

Don't miss out on one more opportunity to win a GLOBE at Night (GaN) Kit and Sky Quality Meter! Here's how:

a. Help protect our night skies by using the GaN Activity Packet to record the brightness of the night sky at any of your astronomy outreach events held during the upcoming campaign: March 22 - April 4, 2011. Download the GaN Activity Packet: [http://www.globeatnight.org/pdf/M-GaNActivityPacket\\_Family\\_2011\\_N\\_Leo\\_Color.pdf](http://www.globeatnight.org/pdf/M-GaNActivityPacket_Family_2011_N_Leo_Color.pdf) (featuring Leo)

b. Record your measurements here: <http://www.globeatnight.org/report.html>

c. When you log your event on Night Sky Network, under Topics Covered, check off "Globe at Night (GaN)" and your event will be entered in the drawing.

Your GaN events held March 22 - April 4, 2011, must be logged on Night Sky Network by April 6th to be entered into the drawing for one of five GLOBE at Night (GaN) Kits with Sky Quality Meter. DRAWING WILL BE HELD ON APRIL 7th.

For more information on the GLOBE at Night campaigns: <http://www.globeatnight.org>

### **Meet at NEAF?**

Are you going to the Northeast Astronomy Forum (NEAF) in New York, April 16-17? Be sure to stop by the Night Sky Network / Astronomical Society of the Pacific booth! Vivian White and Marni Berendsen from the ASP will be at NEAF demonstrating how amateur astronomers like you are helping to expand the hobby through public outreach. NEAF:

<http://www.rocklandastronomy.com/NEAF/index.html>

### **Museums and the Web in Philadelphia**

The Astronomical Society of the Pacific and the Institute for Learning Innovation are heading off the Museums and the Web conference April 6 - 9 to tell the Museum about all the fabulous outreach that NSN clubs do. We hope this publicity gets you more participants and we encourage you to call your local museum (if you haven't already) and pair up for events. You can find more information about our presentation here:

[http://conference.archimuse.com/mw2011/programs/the\\_nasa\\_night\\_sky\\_network\\_its\\_benefit\\_to\\_mu](http://conference.archimuse.com/mw2011/programs/the_nasa_night_sky_network_its_benefit_to_mu)

### **Astronomy Camps: Spread the word!**

What an opportunity! One of the nation's longest running science camps will continue offering its openings this year in events for adults and teenagers.

Astronomy Camps are inspiring adventures in doing real science. Participants become astronomers operating large telescopes (10 to 90-inch diameters), interacting with leading scientists, and interpreting their own observations and measurements. The Camps are held at remote mountaintop observatories on Mt. Lemmon and Kitt Peak near Tucson, Arizona.

Opportunities for Girl Scout leaders are funded by NASA's JWST mission:

<http://astronomycamp.org/>

- Marni Berendsen, Kenneth Frank and Jessica Santascioy, Night Sky Network

## **Something New Under the Sun**

**Scientists are probing deep beneath the surface of our nearest star to calculate its profound effect on Earth**



**Above:** *When a coronal mass ejection reaches Earth, solar particles stream along magnetic field lines, energize gases in the atmosphere and shine as northern lights.*

On an uncharacteristically tropical morning in the San Francisco Bay Area, the ground shimmers with waves of heat, and it's impossible to look to the sky without squinting. But the real heat is inside the Lockheed Martin Solar and Astrophysics Laboratory in Palo Alto. There, in a dark room stacked with computer processors, a high-definition view of the Sun fills nine conjoined TV screens to create a seven-foot-wide, theater-quality solar extravaganza.

Solar physicist Karel Schrijver types commands to start the show: an accelerated movie of a sequence of explosions that wracked the Sun on August 1, 2010. "This is one of the most stunning days I've ever seen on the Sun," Schrijver says. He's been looking at our nearest star for two decades.

"At the beginning this tiny little region decides it's not happy," he says, sounding like an astronomical psychiatrist coping with solar neuroses. He points to a flare, a modest spasm of whitish light. "Then, this nearby region begins to get unhappy, and it flares. Then a huge filament erupts and cuts through the [magnetic] field like a knife. We see this arc of glowing material, and it grows with time. A little filament under the arc says, 'I don't like that one bit,' and it becomes unstable and goes off."

Who knew the Sun has so much personality?

The torrent of images comes from the most advanced satellite ever to study the Sun: NASA's Solar Dynamics Observatory, or SDO. Launched in February 2010, SDO stares at the star from a point 22,300 miles above Earth. The satellite's orbit keeps it at a steady position in view of two radio antennas in New Mexico. Every second, 24 hours a day, SDO beams 18 megabytes of data to the ground. The high-resolution pictures, as well as maps of the Sun's tortured magnetic fields, show the genesis of sunspots and the origins of their outbursts.

This solar movie should provide new insights into space weather—the impacts felt on Earth when the Sun's ejections head our way. Sometimes the weather is mild. The August 1, 2010, eruptions set off colorful displays of aurora borealis over the United States two days later when a fast-moving storm of charged gas disturbed Earth's magnetic field. But when the Sun truly gets angry, the northern lights can signal potentially disabling threats.

The most intense solar storm ever recorded struck in the summer of 1859. British astronomer Richard Carrington observed a giant network of sunspots on September 1, followed by the most intense flare ever reported. Within 18 hours, Earth was under magnetic siege. Dazzling northern lights glowed as far south as the Caribbean Sea and Mexico, and sparking wires shut down telegraph networks—the Internet of the day—across Europe and North America.

A magnetic storm in 1921 knocked out the signaling system for New York City’s rail lines. A solar storm in March 1989 crippled the power grid in Quebec, depriving millions of customers of electricity for nine hours. And in 2003, a series of storms caused blackouts in Sweden, destroyed a \$640 million Japanese science satellite and forced airlines to divert flights away from the North Pole at a cost of \$10,000 to \$100,000 each.

- *Read more: <http://www.smithsonianmag.com/science-nature/Something-New-Under-the-Sun.html#ixzz1IWWQ7Xxi>*

- *By Robert Irion, Smithsonian magazine, April 2011*

## **SWFAS Minutes**

Minutes to past meetings will be published in a future newsletter.

## **Future Events**

CALUSA NATURE CENTER PLNTRM	4-7-11	7:30 PM	MONTHLY MEETING
CALUSA NATURE CENTER PLNTRM	5-5-11	7:30 PM	MONTHLY MEETING
SANIBEL DING DARLING PARK FAMILY	10-17-11	11:00 AM	SOLAR OBSERVING

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