SJAA Activities Calendar
Jim Van Nuland

July (late)
24 **General Meeting** at 8 p.m. Our speaker is Dr. Jonathan Devor. His talk is on “Searching for Eclipsing Binary Stars, and the Strange Things We Find.”
30 Astronomy Class at Houge Park. 8:15 p.m. Topic is TBA. **Note the new starting time.**
30 Houge Park star party. Sunset 8:17 p.m., 77% moon rises 10:21 p.m. Star party hours: 9:15 until midnight.

August
7 Dark Sky weekend. Sunset 8:09 p.m., 5% moon rises 4:32 a.m. Henry Coe Park’s “Astronomy” lot has been reserved.
20 Houge Park star party. Sunset 7:53 p.m., 90% moon sets 3:38 a.m. Star party hours: 8:30 until 11:30 p.m.
28 **General Meeting** at 8 p.m. Our speaker is Dr. Seth Shostak from the SETI Institute. His talk is on “New Approaches to the Search for Extraterrestrial Intelligence”.

September
3 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBA.
3 Houge Park star party. Sunset 7:33 p.m., 23% moon rises 2:09 a.m. Star party hours: 8:30 until 11:30.
4 Dark Sky weekend. Sunset 7:32 p.m., 14% moon rises 3:21 a.m.
11 Dark Sky weekend. Sunset 7:21 p.m., 20% moon sets 9:11 p.m. Henry Coe Park’s “Astronomy” lot has been reserved.
17 Houge Park star party. Sunset 7:12 p.m., 78% moon sets 2:32 a.m. Star party hours: 8:00 until 11:00.
25 **General Meeting** at 8 p.m. Slide and Equipment night (aka “Show and Tell”).

The Board of Directors meets before each general meeting at 6:30 p.m. All are welcome to attend.

24 hour news and information hotline:
(408) 559-1221
http://www.sjaa.net

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EPHEMERIS

The Sun Can Still Remind Us Who’s Boss
Dr. Tony Phillips

Grab your cell phone and take a good long look. It’s indispensable, right? It tells time, surfs the web, keeps track of your appointments and, by the way, also makes phone calls. Modern people can hardly live without one.

One good solar flare could knock it all out.

“In the 21st century, we’re increasingly dependent on technology,” points out Tom Bogdan, director of NOAA’s Space Weather Prediction Center in Boulder, Colorado. “This makes solar activity an important part of our daily lives.”

Indeed, bad space weather can knock out power systems, telecommunications, financial and emergency services—basically, anything that needs electronics to work. That’s why NOAA is building a new fleet of “space weather stations,” the GOES-R satellites.

“GOES-R will bring our existing fleet of weather satellites into the 21st century,” says Bogdan. “They’re designed to monitor not only Earth weather, but space weather as well.”

NOAA’s existing fleet of Geostationary Operational Environmental Satellites (GOES) already includes some space weather capabilities: solar ultraviolet and X-ray telescopes, a magnetometer and energetic...
particle sensors. GOES-R will improve upon these instruments and add important new sensors to the mix.

One of Bogdan's favorites is a particle detector named "MPS-Low," which specializes in sensing low-energy (30 eV – 30 keV) particles from the sun.

Who cares about low-energy particles? It turns out they can be as troublesome as their high-energy counterparts. Protons and other atomic nuclei accelerated to the highest energies by solar flares can penetrate a satellite's exterior surface, causing all kinds of problems when they reach internal electronics. Low-energy particles, particularly electrons, can't penetrate so deeply. Instead, they do their damage on the outside.

As Bogdan explains, "Low-energy particles can build up on the surfaces of spacecraft, creating a mist of charge. As voltages increase, sparks and arcs can zap electronics—or emit radio pulses that can be misinterpreted by onboard computers as a command."

The Galaxy 15 communications satellite stopped working during a solar wind storm in April 2010, and many researchers believe low-energy particles are to blame. GOES-R will be able to monitor this population of particles and alert operators when it's time to shut down sensitive systems. "This is something new GOES-R will do for us,” says Bogdan.

The GOES-R magnetometer is also a step ahead. It will sample our planet's magnetic field four times faster than its predecessors, sensing vibrations that previous GOES satellites might have missed. Among other things, this will help forecasters anticipate the buildup of geomagnetic storms.

And then there are the pictures. GOES–R will beam back striking images of the sun at X-ray and extreme UV wavelengths. These are parts of the electromagnetic spectrum where solar flares and other eruptions make themselves known with bright flashes of high-energy radiation. GOES-R will pinpoint the flashes and identify their sources, allowing forecasters to quickly assess whether or not Earth is in the "line of fire."

They might also be able to answer the question, Is my cell phone about to stop working?


This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.
A trio of planets, plus one
Akkana Peck

Venus, Mars and Saturn all share a small patch of evening sky in early August — close enough to fit in the same binocular field.

There are several close passes between planets this month. Mars and Saturn start the month less than two degrees apart, with much brighter Venus off to the right. Then on the 10th, the three make a triangle with about three degrees between Mars and Venus and a similar amount between Venus and Saturn. Finally, on the 23rd, Mars and Venus are about two degrees apart and have moved off away from Saturn.

While this dance is going on, Mercury hovers below in the twilight glow, the “fourth musketeer”. Around the third week of August it starts waning visibly to a crescent, which happens fast — by the end of that week, the 21st, it’s a very slim crescent and might be getting difficult to see.

Jupiter rises after 9 and is at its best a few hours after midnight. It has a couple of double moon transits this month, but they’re all in the wee hours of the morning — like one on 3:30am on the morning of Friday the 13th. But of course, there’s lots of other detail to watch on Jupiter. Will the south equatorial band come back? What will it look like as it does? How well does the great red spot stand out in the absence of a band?

Neptune is at opposition on August 20, off the left point of Capricornus though technically it’s just over the border to Aquarius. It isn’t very high when it transits, only about 40 degrees, so it might be a bit more challenging than usual. Uranus rises about an hour and a half later and is best viewed in the morning.

The RASC Observer’s Handbook lists “Large tides” on Aug 11-13. I’ve been wanting an excuse to visit some of the tidepool areas on the coast, especially Fitzgerald Marine Reserve, and that’s especially pleasant on hot summer days when I’d like an excuse to head to the coast anyway. So I checked local tide information — and found, incredibly, that the tides in that area are very mild on August 13. I’ve written before (SJAA Ephemeris, April, 2007) about the mismatch between the RASC tide predictions and what we actually see at the beaches here — predicting tides is much more complex than just knowing where the moon and sun are.

Amusingly, as I write this on July 10, it turns out there was an extremely low tide today ... but it was at 5am. Even though there’ll be another one tomorrow, I’m not sure I’m quite that dedicated to tidepooling!

The Shallow Sky

A solar eclipse occurred on July 11, 2010. The path of totality was mostly in the Pacific Ocean before it came ashore in the Patagonia region of Chile. We were lucky enough to be aboard the cruise/cargo ship Aranui 3. This vessel derives more than 60% of its income from shipping items between Tahiti and some of the larger islands and atolls within French Polynesia. The remainder of its income is from taking passengers. The Aranui 3 is not a city-sized cruise ship with formal wear, night club acts and multiple restaurants. Instead, the nearly 200 customers eat in a family-style manner and it is a good thing that the food is always great because you don’t have much of a choice. The crew was hospitable and very helpful, especially in retrieving Paul’s wallet from the sea after Mary accidentally threw it in.

The Aranui 3 left its home port of Papeete on Tuesday, June 29. We were at sea for most of a day before arriving at the atoll Fakarava. This place is noted for its black pearls. The next day we were at sea as the ship traveled at 17 knots toward the Marquesan Archipelago. This area was little known until the TV series “Survivor” taped a season there. The islands we visited had names like Nuku Hiva, Ua Pou, and so on. The first attempt at pronouncing these names was to assume each vowel defined a syllable, though there were exceptions. Most of the natives spoke French at least to outsiders. On board the ship, announcements intended for the crew were in French only. Otherwise, messages to the passengers were repeated in French, English and German.

Despite what may sound like relative deprivation, the accommodations were great. Our cabin was spacious and very comfortable. However, drawers opened and doors creaked when the ocean decided to bounce us around a bit. Most cruise ships these days have stabilizer technologies, which this ship did not. A few people suffered from mal de mer but we had no problem. There were 3 sets of lectures on board the ship given by Rich Talcott, senior editor at Astronomy magazine, and Dennis Mammana, an award-winning sky photographer. We went as part of the group traveling with Melita Thorpe, the owner of the self-named MWT Associates tour agency. Melita was on the cruise with us and we were the largest single block of tourists. Others came in smaller tour groups or came on their own. We were told that only the Christmas time cruises fill up the Aranui unless there happens to be a total eclipse in the itinerary.

On the day of the eclipse, the captain’s plan was to land on an atoll named Hikueru. But on the previous day we were on the atoll Makemo and the morning was quite cloudy. The decision was made to stay at sea and try to find an open patch of sky. So the ship sailed 38 miles south of Hikueru, just a bit south of the centerline when totality started. Our exact location was

Continued on page 4
Solar Eclipse 2010  
Continued from page 3

17° 53.36' south, 142° 20.58' west. The temperature before totality was 85° F and dropped to 77° F during totality. The captain did a fantastic job of finding clear sky with just a few clouds to make it interesting. He then realigned the boat so that the stern was facing the sun to allow maximum viewing from the ship.

The eclipse itself was fantastic! There were audible gasps and exclamations as many observed this phenomena in the sky for the first time (including us). It was dark enough that a few stars were also visible. There was a very obvious diamond ring at the start with a rainbow effect due to the passing of a wispy cloud. The totality seemed way too short, although it was over 4 minutes. Baily's Beads were not noticed by most either at second or third contact. The late diamond ring at third contact seemed longer to most of the experienced eclipse chasers and Talcott noted later that this was an accurate assessment. It seems we were aligned with a lunar valley.

The 2 week cruise ended the day after the eclipse. The complete experience was wonderful. Many of the people in Melita’s group are already planning for the eclipse in Oceania in 2012.

Other eclipse chasers apparently had their own successes. Alex Filippenko (U.C. Berkeley) reported that they missed about 40 seconds around second contact but saw everything else very well. He was on the ship Paul Gauguin. This was Dr. Filippenko’s 11th total eclipse.

Dennis Mammana said that all total eclipses last 7 seconds no matter what they tell you. That was certainly my impression. He also said that his recommendation to all first time solar eclipse viewers was to not take any pictures, just enjoy the moment. Then he said he knew we weren’t going to follow that advice. True enough but still the best advice we got all week.

Clockwise from upper left: The Aranui 3; Mary mugs it up with a tiki; a shore worker rolls a barrel of gasoline as other workers and cruise passengers are nearby; a sumptuous lunch buffet which was the norm on this trip. Photos by the author.
In the upper left is a blow up of a picture from just before second contact (start of totality) that shows a clear prominence near the bottom. In the upper right is a blow up from just after third contact (end of totality) that shows a lot of the coronasphere, the thin red layer of the sun that is only seen during an eclipse. Below are three pictures that closely approximate what the eye sees during a total eclipse: the first diamond ring (note rainbow effect on the left), the corona during totality, and the last diamond ring. All of these pictures are by Les Anderson. At the bottom is a wide angle view of the eclipse and the eclipse watchers onboard the Aranui 3. This photo is by Mary Anderson.
The Last Month In Astronomy

13-JUL-2010  V'ger still there  The Voyager 2 spacecraft has hit the 12,000 day milestone as it travels through the last of the solar system. It is now 12.8 light hours away, 14 billion miles. [http://www.jpl.nasa.gov/news/news.cfm?release=2010-214]

12-JUL-2010  Rosetta meets Lutetia  The ESA Rosetta spacecraft has successfully sent closeup images of the asteroid Lutetia. The pictures show a heavily cratered surface and suggest that this asteroid is a leftover from the original formation of our solar system. The closest approach was about 3162 km. [http://www.ukspaceagency.bis.gov.uk/News%20and%20Events/News/18995.aspx]

6-JUL-2010  Cassini takes a dive  The Cassini spacecraft dove into the Titan atmosphere. This allowed for detailed radar sensing of a dark area that has not been studied this closely before. The closest approach was about 1000 km, not the closest approach for Cassini at Titan but still the lowest until May 2012. [http://www.jpl.nasa.gov/news/news.cfm?release=2010-222&rn=news.xml&rst=2658]

17-JUN-2010  IC 3418 Tails  The tail of IC 3418 has been studied using the Galaxy Evolution Explorer. According to Janice Hester of Caltech, “The gas in this galaxy is being blown back into a turbulent wake...The new observations are teaching us that this heavier, star-forming gas can form in the wake, possibly in swirling eddies of gas.” This galaxy is not only interacting with another galaxy but with the entire Virgo cluster of galaxies. The Virgo cluster consists of 1500 galaxies and is located 54 million light years away. [http://www.jpl.nasa.gov/news/news.cfm?release=2010-202]

17-JUN-2010  7th graders find Martian cave  Students at Evergreen Middle School in Cottonwood, CA were examining lava tubes as part of their activity in the Mars Student Imaging Program - a program offered by NASA and Arizona State University. In the process of doing so they spotted what might be a hole into a Martian cave. [http://asunews.asu.edu/20100617_skylight]

6-JUL-2010  Planck's View of the Whole Sky  The image shown here is from the Planck spacecraft using microwave radiation from 30 to 857 gigahertz. In this picture, the tiny temperature fluctuations from the Big Bang are visible in the top and bottom sections. The stronger radiation through the center is from the Milky Way. This image of the microwave sky was synthesized using data spanning the range of light frequencies detected by Planck. These low frequencies cannot be seen with the human eye. The image is the result of 12 months of observations — the result of the first all-sky survey by Planck. Image credit: ESA, HFI & LFI consortia (2010) [http://www.nasa.gov/mission_pages/planck/planck20100706-i.html]

[Image of the microwave sky]
Loaners

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. For more information please see the loaner program web page: http://www.sjaa.net/loaners

Q & A

Q: Just doing a raw count of living cells, what percentage of the cells in your body are bacteria cells.

A: About 90%. ("Death from the Skies", Phil Plait, pg. 184)

Dues Change

Effective January 1, 2011, the SJAA membership dues will be changed. The regular dues will remain at $20 but only for members choosing the electronic version of this newsletter. Those who want to continue with the print version will find that their dues are $30.

Hot Dates

SETicon - Aug. 13-15, Santa Clara. SETicon will offer fascinating and fun panels about astrobiology and SETI research, with speakers ranging from SETI Institute scientists to science fiction actors. For more info go to: http://www.seticon.com/

SJAA Yosemite Public Star Party 2010 - Sept. 3-5


Family Friendly Links

The SciJinks Weather Laboratory at http://scijinks.gov targets middle-schoolers and explains the reasons for the seasons, the tides, and other weather and Earth science mysteries.

NASA Climate Kids at http://climate.nasa.gov/kids demystifies the "Big Questions" about global climate change using 4-6th-grade-level language.

“I can find in my undergraduate classes, bright students who do not know that the stars rise and set at night, or even that the Sun is a star”

- Carl Sagan

Publications Statement

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Articles for publication should be submitted by the 10th of the previous month. The PDF version is generally available by the 24th of the previous month and the HTML version by the last day of the previous month.

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- Carl Sagan
San Jose Astronomical Association Membership Form

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☐ New  ☐ Renewal (Name only if no corrections)

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☐ Junior (under 18) — $10
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Subscribing to Sky & Telescope magazine through the SJAA saves you $5 off the regular rate. (S&T will not accept multi-year subscriptions through the club program. Allow 2 months lead time.)

☐ I prefer to get the Ephemeris newsletter in print form. The newsletter is always available online at http://ephemeris.sjaa.net

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Send e-mail to membership@sjaa.net

Bring this form to any SJAA Meeting or send to the club address (above). Please make checks payable to “SJAA”.

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