



Roanoke Valley Astronomical Society

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JWST vs. CanariCam

By Clark M. Thomas

The laws of economics are ultimately more powerful than laws passed by legislators. Underlying the economic laws are yet other profound laws, such as Malthusian population forces, Darwinism, and ultimately the fundamental laws of interpenetrating systems. That's a lot to swallow, so we citizens and our politicians tend to focus on personalities and on easy associations.

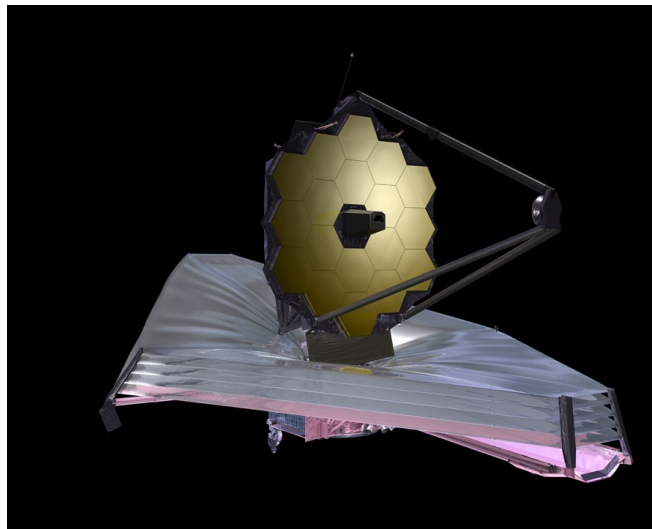
Astronomy on the large scale is not immune to the laws of economics. For a while, when the national debt was low, and when it was the good USA vs. the evil USSR, most Americans were strongly behind Big Astronomy as we sought to plant our flag on the Moon before the commies got there. Science always was an afterthought. American heroism was the real prize.

Even before the Apollo era ended, there was a sharp drop-off in interest among Americans. There was a war in Vietnam to wage, and hippies to squash. We had other ways to flex our cultural muscles. Then along came Hubble.

Hubble is the gold standard for Big Astronomy, the ultimate astronomical scientific tool. For over a generation this marvelous instrument has opened up major portions

of the heavens, astonishing and romancing even the indifferent masses.

However, Hubble's fairly limited infrared capabilities have minimized its operational bandwidth. Not to worry, the electromagnetic spectrum is large. Other space-based instruments have explored such realms as Xrays and a larger portion of the infrared. The modestly expensive Kepler and Spitzer have recently opened up more of the infrared.



Artists Conception: JWST

Why is infrared so important? Interstellar dust absorbs visual light, but it is not nearly as absorbent of the infrared. Many objects hidden from Hubble's sharp eye can be detected by Spitzer and Kepler — and even more by the James Webb. Nevertheless are their powers enough to answer fundamental questions about our origins, and about life outside our solar system?

The JWST is designed to go beyond Kepler and Hubble. It is going to see even deeper into the past — but only to where we will get slightly closer to the local big bang. It is not going to reveal "the moment of creation," as some proponents of the trouble plagued European atom

(JWST Continued on page 2)

smasher dream.

In a patriotically perfect world (where we imagined we were living when JFK challenged us to be first on the Moon) all things seem possible. Now, however, we are witnessing the evisceration of the American middle class, massive debt accumulations, and never-ending red ink in the perpetual pursuit of bad guys on the other side of our planet. It's hard for a noble scientific experiment other than Hubble to compete with all that mess, and Hubble has already been paid for in money and blood.

The James Webb Space Telescope is supposed to be Hubble's successor, but it will only be one of several grand space platforms, all unmanned. Hubble would be virtual space junk if it were not for the fabulously expensive Shuttle and its five service missions. JWST cannot be serviced by humans in space. This is where the critical problem lies.

Many billions of dollars will evaporate if the JWST is not a perfect launch and deployment. I believe it is likely that NASA will dazzle us with perfection; but it is also not hard to imagine something less than perfection. Because of its umbrella style design, anything less than de-cocooning perfection would be total failure. Imagine what the political backlash would be if such a failure occurred. All sorts of astronomy projects could be endangered. I don't want this to ever happen to our science, if we can do a technical work around with other instruments to get the same or similar cosmological science.

Futuristic astronomy is close upon us. There are now several huge land instruments with great light gathering power and "laser guide stars," along with active adjustment of segmental mirrors to offset atmospheric distortions. Furthermore we can link distant radio telescopes with computers to make virtual instruments nearly as large as the Earth's diameter.

Right now, the world's largest telescope is on the Canary Islands. Its mirror is just over 30 feet in diameter. That's good, but what's exciting is an attached instrument that only cost \$3.2 million dollars (vs. a projected \$6.5 billion, and likely much more, for JWST).

A University of Florida press release (July 14, 2011) says this:

"GAINESVILLE, Fla. — University of Florida astronomers are testing a new infrared camera this summer at the world's largest telescope that will allow researchers to look for planets outside our own solar system and better explore hidden black holes at the centers of galaxies.

The commissioning of CanariCam, a high-tech, heat-sensitive camera, started in late June at the site of the biggest optical-infrared telescope in the world. Gran Telescopio Canarias, or Grantecan, is located at 7,438 foot-altitude on the island of La Palma, in Spain's Canary Islands off the northwest coast of Africa.

CanariCam, created by a team of astronomers and engineers led by UF astronomy professor Charles Telesco, had a cost of \$3.2 million, financed by the Spanish government, and will allow researchers to peer through obscuring interstellar dust with unprecedented accuracy."



CanariCam

If I were an absolute emperor, I would slow down JWST, but not kill it. This will allow NASA more time to develop needed deployment technology. Some of the billions saved could be devoted to more cost-effective astronomy, and to the development of cybernetic comphumans that would journey as our ambassadors to distant orbs within our own solar system. Some savings would go to appease deficit hawks. In this scenario everybody wins.

SuperSid

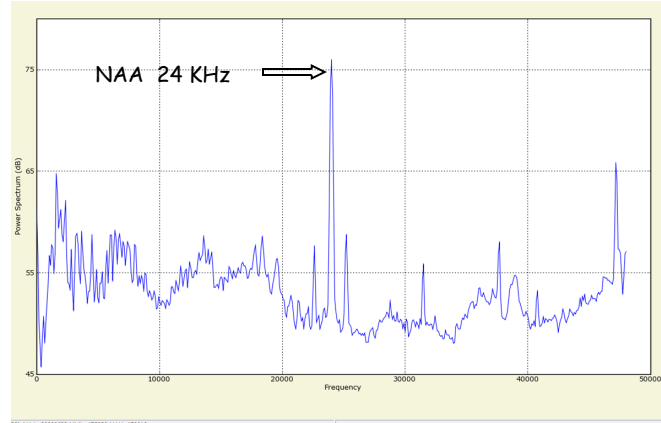
By Dave Thomas

[Stanford University in California](#) sponsors an educational initiative called, Sudden Ionospheric Disturbance Space Weather Monitor, or [SuperSid](#). The program uses a Very Low Frequency, VLF, radio receiver to monitor the effect of Solar X-ray flares on the ionosphere by monitoring the signal strength of VLF transmissions from various transmitters around the world. These transmitters are used to communicate with submerged submarines because the signals penetrate below the surface of the water allowing them to communicate without surfacing.

There are several of these VLF transmitters that can be heard in this area. Station NAA on 24KHz with 1000 KW of power, located in Cutler, Maine, NML on 25.2 KHz with 500 KW of power, located in LaMoure, North Dakota, NAU on 40.75 KHz with 100 KW of power, located in Aquada, Puerto Rico, and NLK on 24.8 KHz, in Jim Creek, Washington with 250 KW of power. Of these NAA is the strongest.

The receiver is basically an amplifier that responds to frequencies from 0 to 48,000 hertz. The output is fed into a sound card on a PC or Laptop. A special graphing program displays an analog graph that refreshes every five seconds. The program produces, and buffers,

formation by ftp to the [Stanford server](#) at the end of the day, Universal Time.



SuperSid Real time Graph

The [antenna](#) for the SuperSid consists of a pvc frame with a coil of 20 AWG insulated solid copper wire 46 inches on each side totaling 400 feet. The antenna is small enough to locate indoors if needed. The received signal is coupled to the receiver via RG-6 coax, the same type used on satellite and cable TV systems. The materials for construction of the antenna are available from most home improvement stores such as Lowes or Home Depot.



SuperSid Receiver



SuperSid Loop Antenna

comma separated values, csv, files, every five seconds along with information on station name, location, and signal levels. The program automatically sends the in-

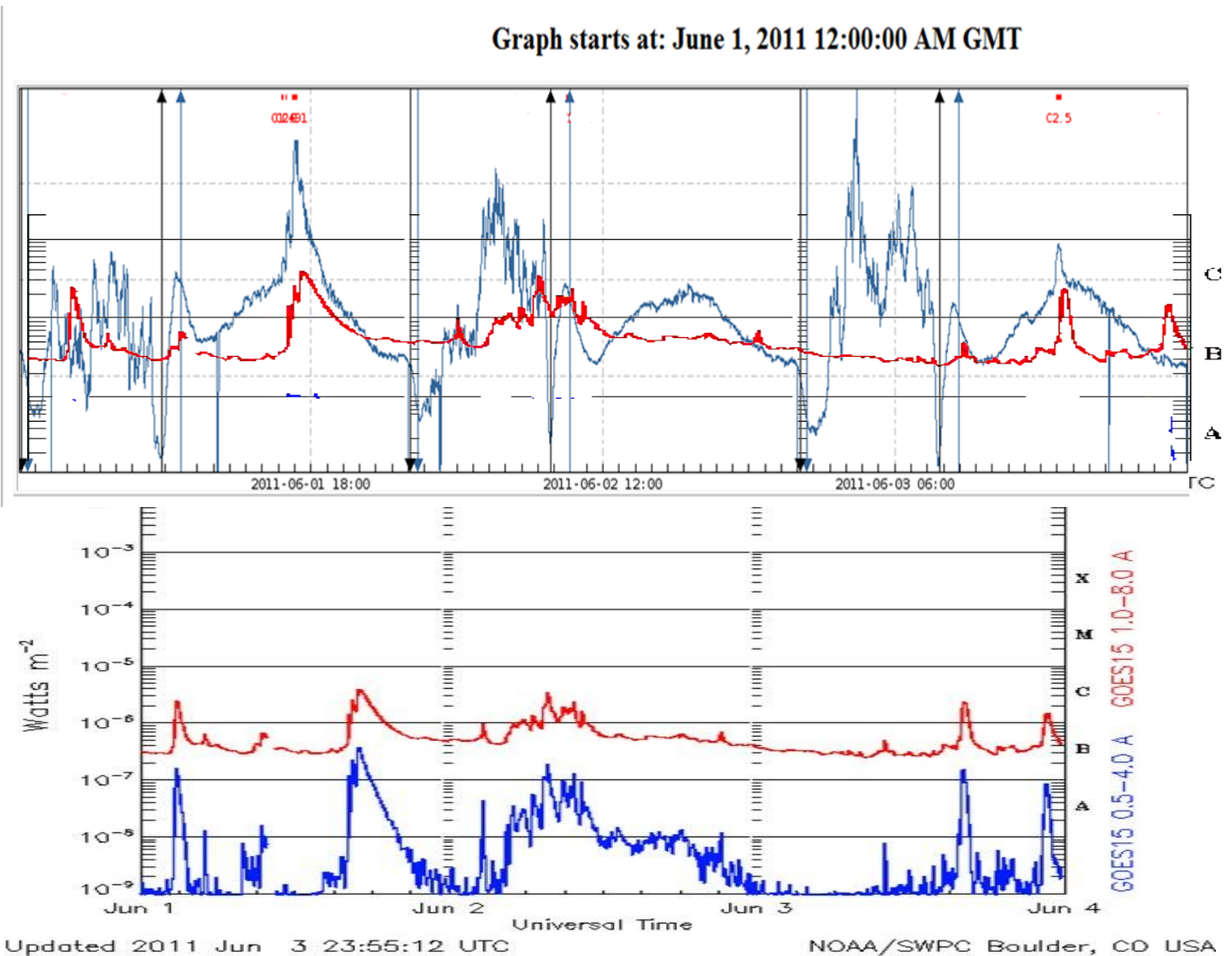
The SuperSid system is an inexpensive way to monitor

(SuperSid Continued on page 4)

Solar activity indirectly. By obtaining the SuperSid monitor and building the loop antenna required for reception of the VLF signals you can learn about how the Sun affects the Earth's ionosphere and this in turn affects radio propagation. More information is available on the SuperSid project at Stanford.edu, and the Society of Amateur Radio astronomers.

The chart below shows a three day period, beginning on 06-01-2011, in which there were several "C" class X-ray flares on the Sun during the daylight hours in Lynchburg, Virginia. The black and blue vertical arrows represent local sunrise, and the black down arrows local sunset.

The blue lines represent the received signal strength of the VLF transmitter NAA in Cutler, Maine at a frequency of 24 KHz. This part of the chart was generated by the server at Stanford University in California from the information from the csv files generated by the SuperSid program running on the PC in Lynchburg. The red chart information is data from the same three day period from the GOES X-Ray satellite and is overlaid on the Stanford chart.



RVAS begins Club Lunar observing sessions

By John Goss

Last month the RVAS began holding club lunar observing session for members to work on completing the Astronomical League's Lunar Observing Club. These sessions continue this month. If you haven't started yet, you may begin working on the Lunar Club's list at any session in August. Please bring a pair of binoculars, a telescope, and a lunar filter, if you have one. Please join us for a little moongazing!



Fred Davis and Sharon Stinnette exploring features on the moon.

August's sessions:

Wednesday (8/3) - Waxing Crescent (4-day old moon) — 8:30 p.m., Explore Park Overlook

Saturday (8/6) - First Quarter (7-day old moon) — 8:15 p.m., Discovery Center parking lot

Tuesday (8/9) - Waxing Gibbous (10-day old moon) — 8:30 p.m., Discovery Center parking lot

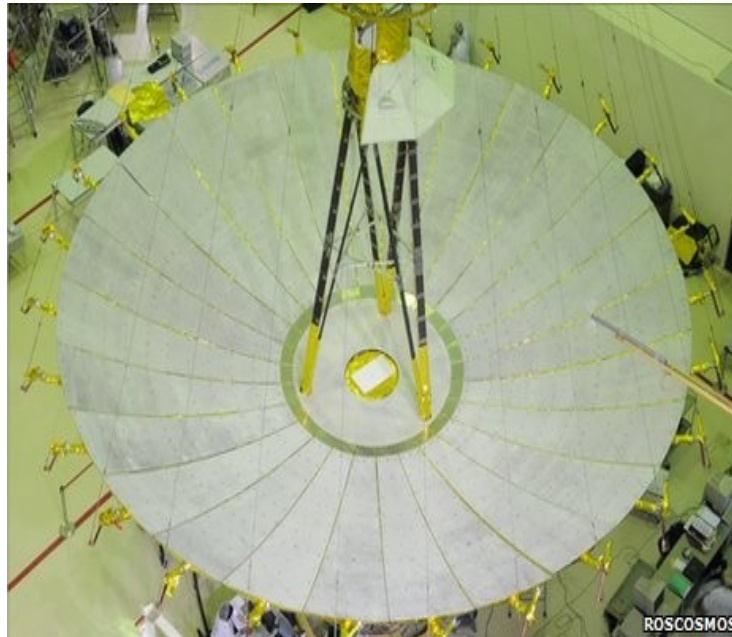
Saturday (8/13) - Full Moon (14-day old moon) — 9:30 p.m., Explore Park Overlook

RadioAstron

Russian Space Radio Telescope

By Dave Thomas

The RadioAstron Space Radio Telescope, a Russian initiative, was launched on July 17, 2011. The telescope will be the space component of a VLBI, Very Long Baseline Interferometer. The separation will be 30 Earth diameters at apogee, about 300,000 Km, or 219,000 miles, and will give the telescope a greater resolution than the Hubble Space Telescope, although it will look at



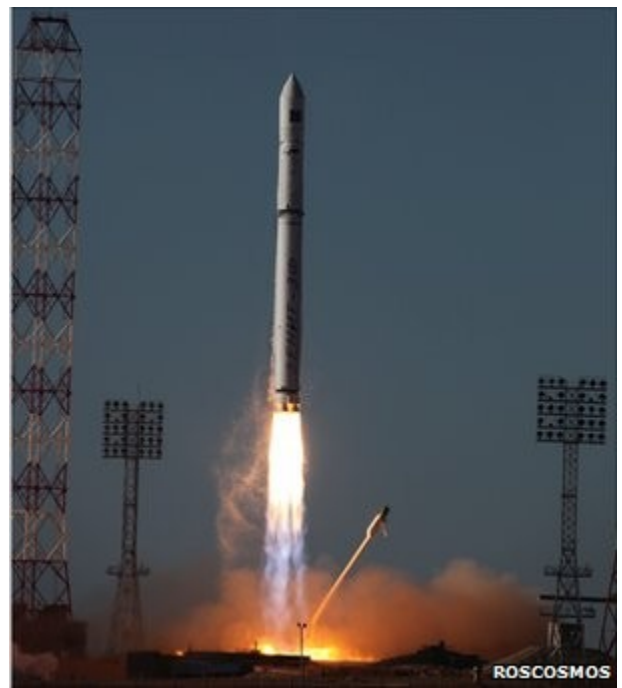
radio sources rather than optical.

The RadioAstron will have a foldable parabolic reflector 10 meters in diameter, when deployed. It will cover the spectrum from 92 through 1.3 centimeters. The system will collect data at a rate of 144 Mbs. The ground communications will be at a frequency of 15 GHz with a download rate of 32 Kbps.

RadioAstron under construction



Artists Conception: RadioAstron in orbit



RadioAstron Launch vehicle

Astro-Quiz

By Frank Baratta

The Metro Atlanta Solar System Model places the Sun at the Bradley Observatory and Earth a 3-inch diameter ball one kilometer away. At that scale, where would be a good site to place Barnard's Star, which lies about 6 light-years from Earth?

Answer to Last Month's Astro-Quiz: What's the brightest star located within 5 degrees of the celestial equator? It's epsilon Orionis, otherwise known as Alnilam, the middle star in the belt of Orion. At magnitude 1.69, it lies just 1.2 degrees south of the celestial equator. The next brightest is Alnitak, zeta Orionis, at the eastern (left) end of Orion's belt, which lies 1.9 degrees south of the celestial and shines at magnitude 1.74. At a distance of 5.2 degrees north of the celestial equator, 0.36 magnitude Procyon just misses taking the prize of brightest and closest.

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of astronomical observational and photographic activities. **Meetings are held at 7:30 p.m. on the third Monday of each month, at Western Va. Community College Natural Science Center, 3102 Colonial Ave. S.W. Roanoke, Virginia. Meetings are open to the public.** Observing sessions are held one or two weekends a month at a dark-sky site. Yearly individual dues are \$20.00, Seniors \$18.00. Family dues are \$25.00, Senior Family \$22.00 . Student dues are \$10.00. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

RVAS web page: <http://rvasclub.org>

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CALENDAR OF EVENTS

By Frank Baratta

MONTHLY MEETING: Monday, August 15th , 7:30 p.m.,

Western Va. Community College Natural Science Center

3102 Colonial Ave. S.W.

Roanoke, Virginia

Program: To be Announced

RVAS WEEKEND OBSERVING SESSIONS: Unless otherwise indicated, observing sessions are held at Cahas Mountain Overlook, milepost 139 on the Blue Ridge Parkway.

◇ **Friday and Saturday, August 19th and 20th.** Sunset is at 8:07 p.m. Astronomical twilight ends at 9:41 p.m. The Moon rises at 11:24 p.m. and 12:05 a.m., respectively.

◇ **Friday and Saturday, August 26th and 27th.** Sunset is at 7:57 p.m. Astronomical twilight ends at 9:29 p.m. The Moon sets at 6:10 and 6:48 p.m., respectively.

◇ **Future Sessions: Saturday September 17th** (Annual RVAS Picnic and Star Party)
Observing Sessions September 23rd and 24th.

ROANOKE CITY PARKS and RECREATION PUBLIC STARGAZE: Saturday, August 27th, 8:30 p.m., Cahas Overlook, Milepost 139 Blue Ridge Parkway. Non-members must register with Parks & Rec. at 540-853-2236. Members can call 540-774-5651 for information. (Next session: September 27th, 7:45 p.m., Cahas Overlook.)