Solar sail flares can be seen in broad daylight

February 3 2011, By Dr. Tony Phillips

A camera in Finland caught NanoSail-D flaring on Jan. 30th. The streak of light was almost three times brighter than a 1st-magnitude star. Credit: Esko Lyytinen.

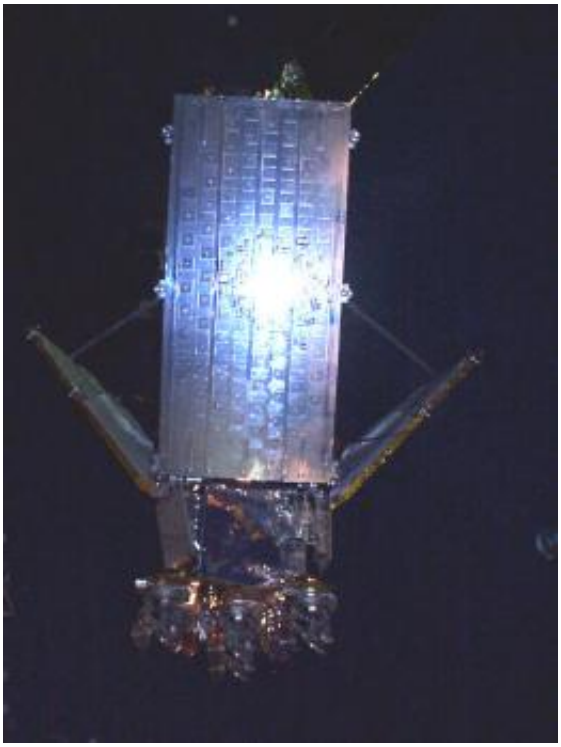
It's a calm and peaceful night. Stars twinkle in the velvety darkness overhead as a distant plane blinks silently on the horizon. You could almost hear a pin drop. That is, until the flare.

High overhead, out of the darkness, a bright light surges into view. For 5 to 10 seconds it outshines the brightest stars in the sky, mimicking a supernova, perhaps even casting faint shadows at your feet. The silence is broken by your own excited shouts.

Could this happen to you?

"It could, if you happen to be outside when NanoSail-D flies by," says

Dean Alhorn of the Marshall Space Flight Center in Huntsville, AL. "We think the spacecraft could produce this kind of display from time to time when sunlight glints off the reflective fabric of its solar sail."



The reason for Iridium flares. Credit: SeeSat-L.

On Jan. 21st, NanoSail-D unfurled a 10 m^2 sail 650 km above Earth's surface, becoming the first solar sail to orbit our planet. For the next few months it will skim the top of the atmosphere, slowly descending in a test of 'drag sails' as a means of de-orbiting space junk. If all goes as planned, the spacecraft will disintegrate like a meteor in April or May of 2011, dispersing harmlessly more than 100 km high.

Meanwhile, sky watchers should be alert for flares.

Many people have already seen Iridium flares--brilliant flashes of sunlight glinting off the flat antennas of Iridium communication satellites. Some Iridium flares are so bright, they can be seen in broad daylight. NanoSail-D could be even brighter.

"The surface area of our sail is six times greater than that of a single Iridium antenna," points out Alhorn. "Plus, we're closer to Earth. It all adds up to a much brighter flash."

As NanoSail-D gets closer to Earth, it could theoretically produce flashes of light 10 to 100 times (2.5 to 5 astronomical magnitudes) brighter than the planet Venus. That's the sort of thing you can see even through city lights.

In between flares, however, the sail is fairly dim. Internationally-recognized satellite tracking expert Ted Molczan describes what he and others have been seeing:

"NanoSail-D can be a challenging object to spot, but by no means impossible. At its faintest, it has been invisible even in large binoculars, but at its brightest, it has been seen easily with the un-aided eye. The great variation in brightness is due to its shape; it is a large, thin sheet of highly reflective material. Seen edge-on, it is faint, but seen face-on at a favorable sun-angle, it may rival the brightest stars."

A conjunction of the Moon and NanoSail-D over Buenos Aires, Argentina, photographed by Enzo De Bernardini on Jan. 27th. On this occasion, the sail was not visible to the unaided eye. De Bernardini used a 3-inch refracting telescope to capture the 7th-magnitude streak.

NanoSail-D flyby predictions may be found in several places on the web: Heavens-Above, Spaceweather.com, and Calsky among others. These sites will tell you when the sail will soar overhead--but not when it will flare. The orientation of the sail isn't known precisely enough for that.

"Because it is impossible to predict exactly when NanoSail-D will be bright, observers can increase their chance of success by watching over a period of least several minutes," says Molczan. "A plot of its predicted path on a star chart, with annotations of the time at intervals of one minute or so, will help the observer stay focused on the satellite's approximate position as it moves across the sky. Observe with the unaided eye, or binoculars with a wide field of view, like 7x50s."

The brightest flares are likely to occur when the spacecraft is near the horizon. Former NanoSail-D principal investigator Mark Whorton (previously at NASA, now at Teledyne) explains why:

"Early in the mission NanoSail-D will be tumbling, so it really doesn't matter where it is in the sky. Flashes might occur almost anywhere along its path. But later in the mission it will be aerodynamically stabilized: the flat surface of the sail will face forward, much like the sail on a terrestrial sailing ship. That means you will see it edge on (dim) when it is directly overhead and face on (bright) when it is closer to the horizon."

So check the predictions, go outside and take a look. Says Alhorn, "You

might see something worth shouting about."

More information: www.nasa.gov/mission_pages/sma …lsats/nanosaild.html

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