

The Aerospace Update

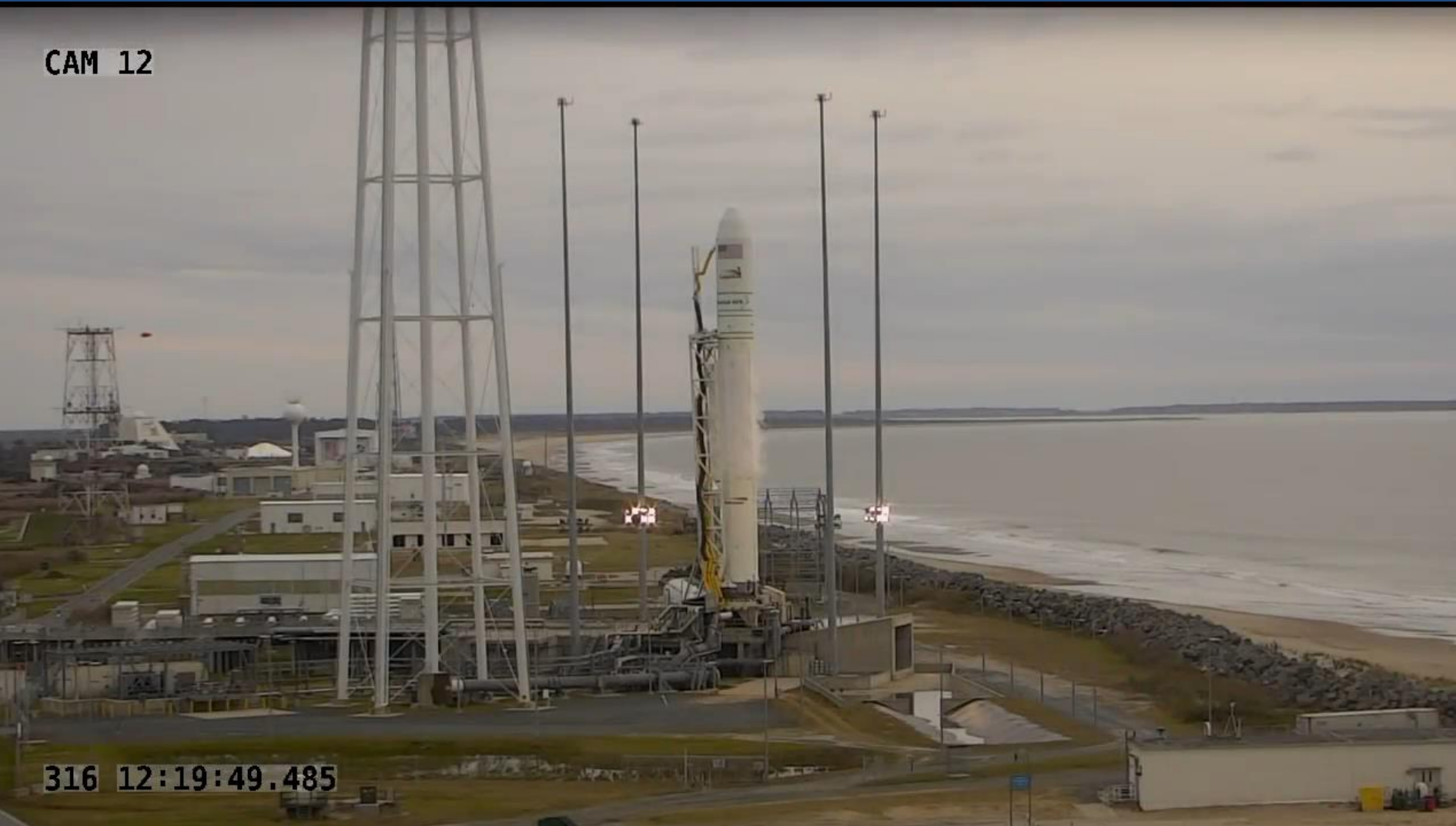
A satellite view of Earth from space, showing the curvature of the planet and the blue ocean with white clouds. The image is taken from a high angle, looking down at the Earth's surface. The ocean is a deep blue, and there are several large, white, swirling cloud formations. The horizon of the Earth is visible at the top of the frame, with a thin layer of atmosphere above it. The background is the blackness of space, with a few small, distant stars visible.

Ocean Moon Glint and City Night Lights

Nov 14, 2017

Image Credit: Jack Fischer /NASA

Space Station Cargo Shipment Blasts Off Aboard Antares Rocket



Running a day late after an airplane strayed into restricted airspace, scrubbing a launch attempt on Saturday, an Orbital ATK Cygnus supply ship packed with 3.7 tons of cargo, supplies and experiments rode an Antares rocket into orbit from Virginia's Eastern Shore on Sunday Nov 12th, setting course on a two-day pursuit of the International Space Station. Two Russian-built RD-181 main engines gave the Antares rocket an initial boost with around 864,000 pounds of thrust, then a solid-fueled Castor 30XL second stage, made by Orbital ATK, motor ignited to finish the task of placing the Cygnus cargo craft into orbit.

Video courtesy of NASA

*Source: Stephen Clark @
SpaceFlightNow.com*

“S. S. Gene Cernan”



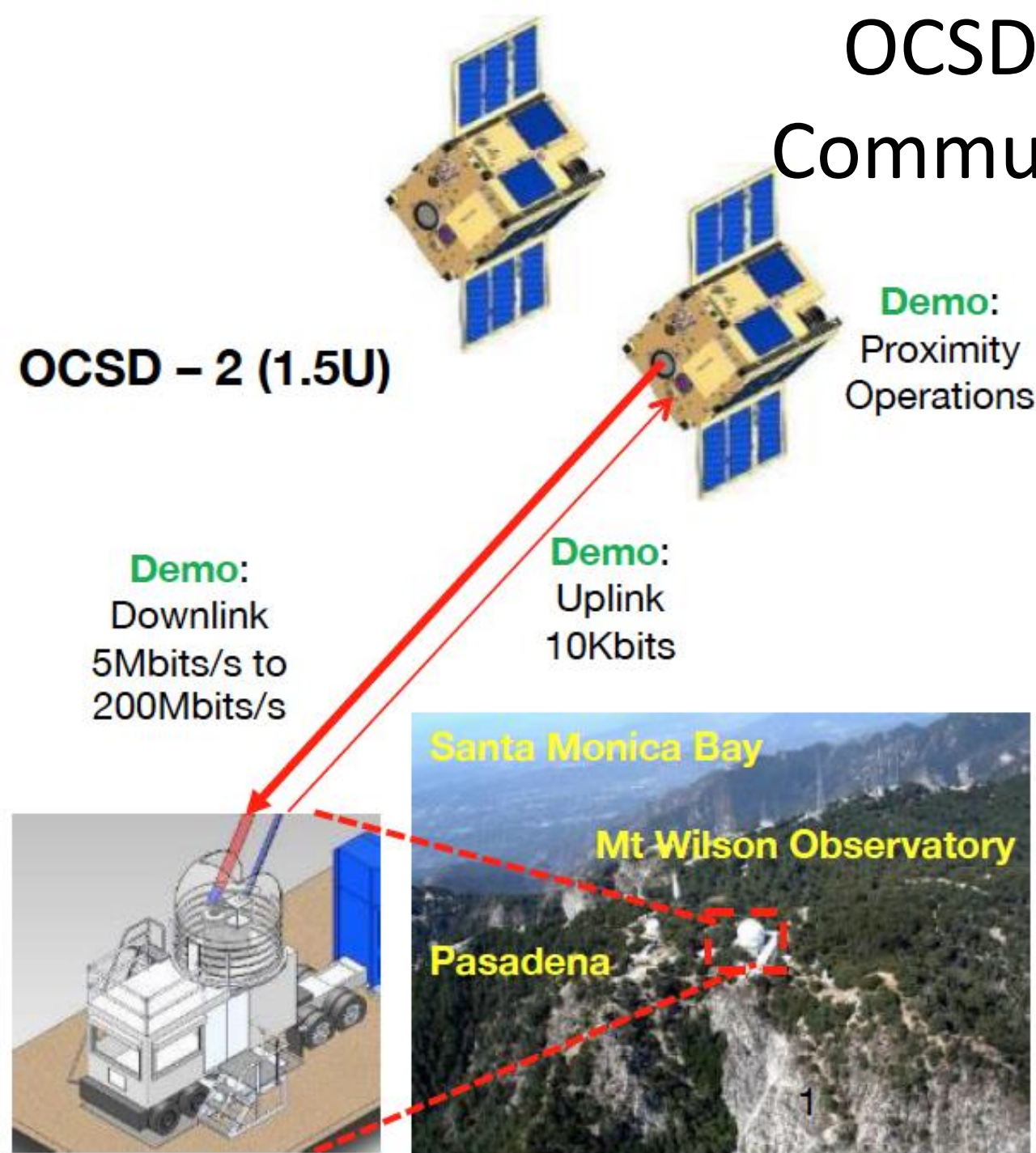
The Cygnus spacecraft, named “S. S. Gene Cernan” after the Apollo 17 astronaut who passed away earlier this year, arrived at the ISS on Tuesday, Nov 14th when Then, Expedition 53 crew members Paolo Nespoli of the European Space Agency (ESA) and Randy Bresnik of NASA grappled the spacecraft and berthed it to the Earth-facing port of the *Unity* Module. After docking with the ISS, the Cygnus capsule will be unloaded and then utilized as an extension of the orbiting laboratory for the first time, which will be for an experiment employing the Space-Tango facility named TangoLab-1 – a reconfigurable general research facility designed for microgravity research and development. The Cygnus module will remain berthed at the ISS until December 4 when, after the crew have removed the lab, the spacecraft will undock from the space station. A NanoRacks deployer aboard the module will then release 14 CubeSats prior to the capsule’s destructive re-entry into Earth’s atmosphere, incinerating several tons of trash on board over the Pacific Ocean.

OCSD to Demonstrate Laser Communication from a CubeSat

The Optical Communications and Sensor Demonstration (OCSD) mission, carried onboard Orbital ATK's Cygnus cargo ship, will showcase the first-ever high-speed data downlink from a CubeSat to a ground station using lasers, in addition to maneuvering the pair of diminutive spacecraft to up-close proximity. Once the Cygnus craft has completed its ISS servicing mission, it will detach from the ISS and move to a higher orbit from which the two OCSD CubeSats will be deployed to begin its mission. The primary mission is demonstrating laser communications, by using a laser on the spacecraft to downlink data to optical ground stations on Mt. Wilson in California using data rates orders of magnitude higher than what can be done using radio frequencies. The second OCSD mission, proximity operations, will involve the two satellites approaching and maneuvering around one another, within a range of 200 to 2000 meters.

Source: SpaceDaily.com & NASA.gov

Image Credit: Nasa.gov



OCSD - 2 (1.5U)

Demo:
Proximity
Operations

Demo:
Downlink
5Mbits/s to
200Mbits/s

Demo:
Uplink
10Kbits

Santa Monica Bay

Mt Wilson Observatory

Pasadena

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Integrated Solar Array and Reflectarray Antenna (ISARA)



A second CubeSat mission carried on the Cygnus Cargo Ship is the Integrated Solar Array and Reflectarray Antenna (ISARA) mission. It will demonstrate a reflectarray antenna that increases downlink data rates for CubeSats from the existing baseline rate of 9.6 kilobits per second (kbps) to more than 100 megabits per second (Mbps). The reflectarray antenna consists of three panels, electrically tied together through hinges, which have an array of printed circuit board copper patches on them. The size of the patches are adjusted so that the phase of the reflected feed illumination collimates the radiation in much the same way a parabolic dish reflector would. Unlike a parabolic dish, however, the reflectarray panels are flat, which enables them to be folded down against the CubeSat.

Sierra Nevada's Dream Chaser Successfully Completes Glide Flight



Credit: NASA

snc

Video courtesy of Sierra Nevada Corporation

In the long-awaited test, a helicopter carried the Dream Chaser engineering test article aloft and released it at an altitude of more than 3,000 meters (10,000 feet), allowing the vehicle to glide to an unmanned, fully autonomous landing on runway 22L at Edwards AFB. The flight was the second free flight of the Dream Chaser. The vehicle flew a similar glide flight in October 2013, which the company and NASA considered successful despite a landing gear failure that caused the vehicle to skid off the runway after landing. Sierra Nevada won a Commercial Resupply Services 2 contract from NASA in 2016 to transport cargo to and from the ISS. A first flight of the Dream Chaser Cargo System is scheduled for 2020, with a minimum of six flights through 2024 under the contract.

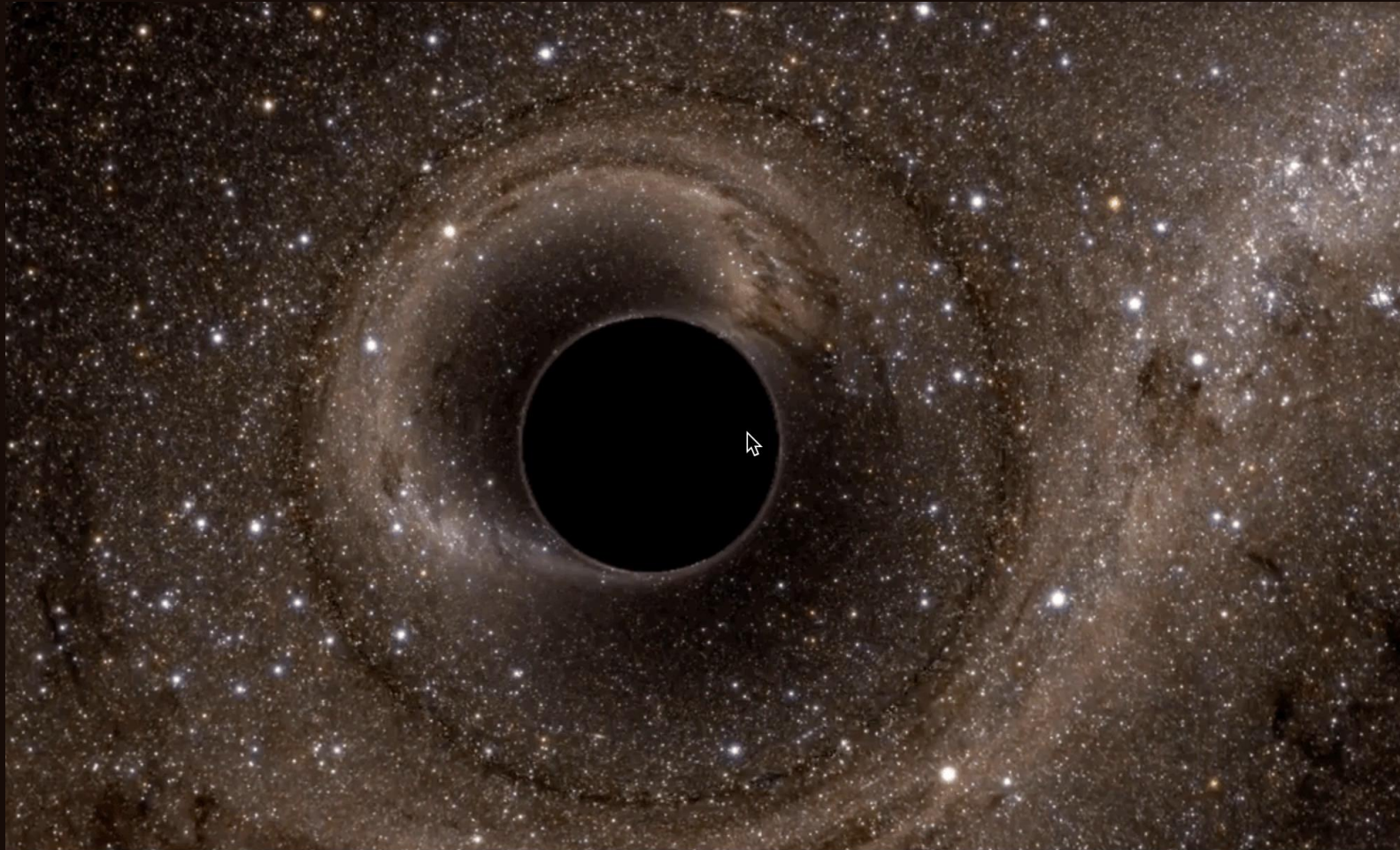
Source: Jeff Foust @ SpaceNews.com

Jupiter's Stunning Southern Hemisphere



See Jupiter's southern hemisphere in beautiful detail in this new image taken by NASA's Juno spacecraft. The color-enhanced view captures one of the white ovals in the "String of Pearls," one of eight massive rotating storms at 40 degrees south latitude on the gas giant planet. The image was taken on Oct. 24, 2017 at 11:11 a.m. PDT (2:11 p.m. EDT), as Juno performed its ninth close flyby of Jupiter. At the time the image was taken, the spacecraft was 20,577 miles (33,115 kilometers) from the tops of the clouds of the planet at a latitude of minus 52.96 degrees. The spatial scale in this image is 13.86 miles/pixel (22.3 kilometers/pixel).

Listening for Gravitational Waves Using Pulsars



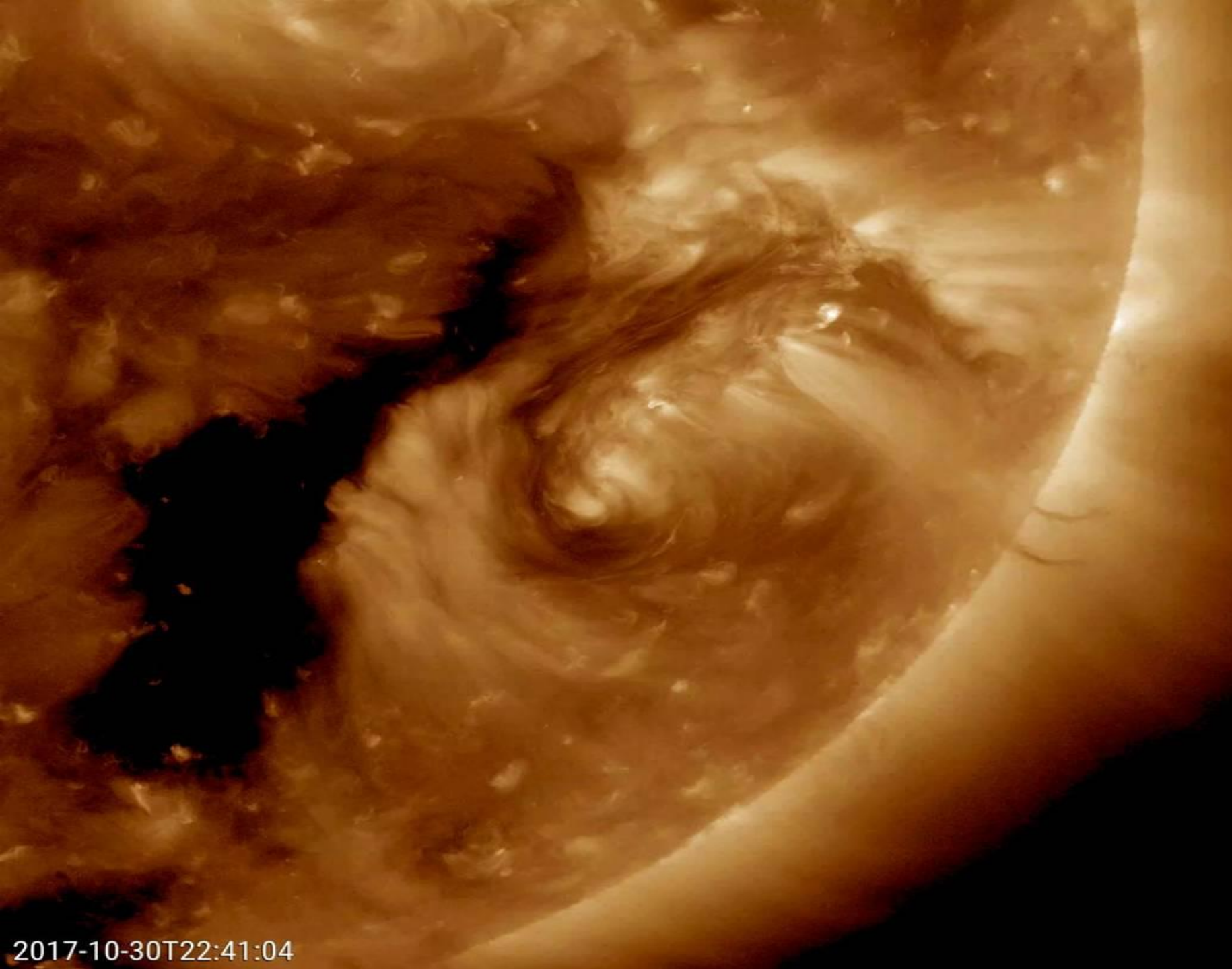
Video Animation Credit: SXS

New research published November 13 in *Nature Astronomy* predicts that gravitational waves generated by the merger of two supermassive black holes will be detected within 10 years. While those gravitational waves are strong, they lie outside the wavelengths currently observable by ongoing experiments such as LIGO and Virgo. The new hunt for gravitational waves formed by merging supermassive black holes will instead leverage stars called pulsars that act like cosmic metronomes. The rapidly spinning stars send out a steady rhythm of radio wave pulses. As passing gravitational waves stretch and compress the space between Earth and the pulsar, the rhythm slightly changes. Those changes are then monitored by pulsar-watching projects on Earth.

Source: Phys.org

Star Exploded, Survived, and Exploded Again More than 50 Years Later

An international team of astronomers including Carnegie's Nick Konidaris and Benjamin Shappee discovered a star that exploded multiple times over a period of 50 years. The finding, published by Nature, completely confounds existing knowledge of a star's end of life. In September 2014, the intermediate Palomar Transient Factory team of astronomers detected a new explosion in the sky, iPTF14hls. The light given off by the event was analyzed in order to understand the speed and chemical composition of the material ejected in the explosion. This analysis indicated that the explosion was what's called a type II-P supernova, and everything about the discovery seemed normal. Until, that is, a few months later when the supernova started getting brighter again. Type II-P supernovae usually remain bright for about 100 days. But iPTF14hls remained bright for more than 600! What's more, archival data revealed a 1954 explosion in the exact same location. It turned out that somehow this star exploded more than half a century ago, survived, and exploded again in 2014.



Rare Encircling Filament

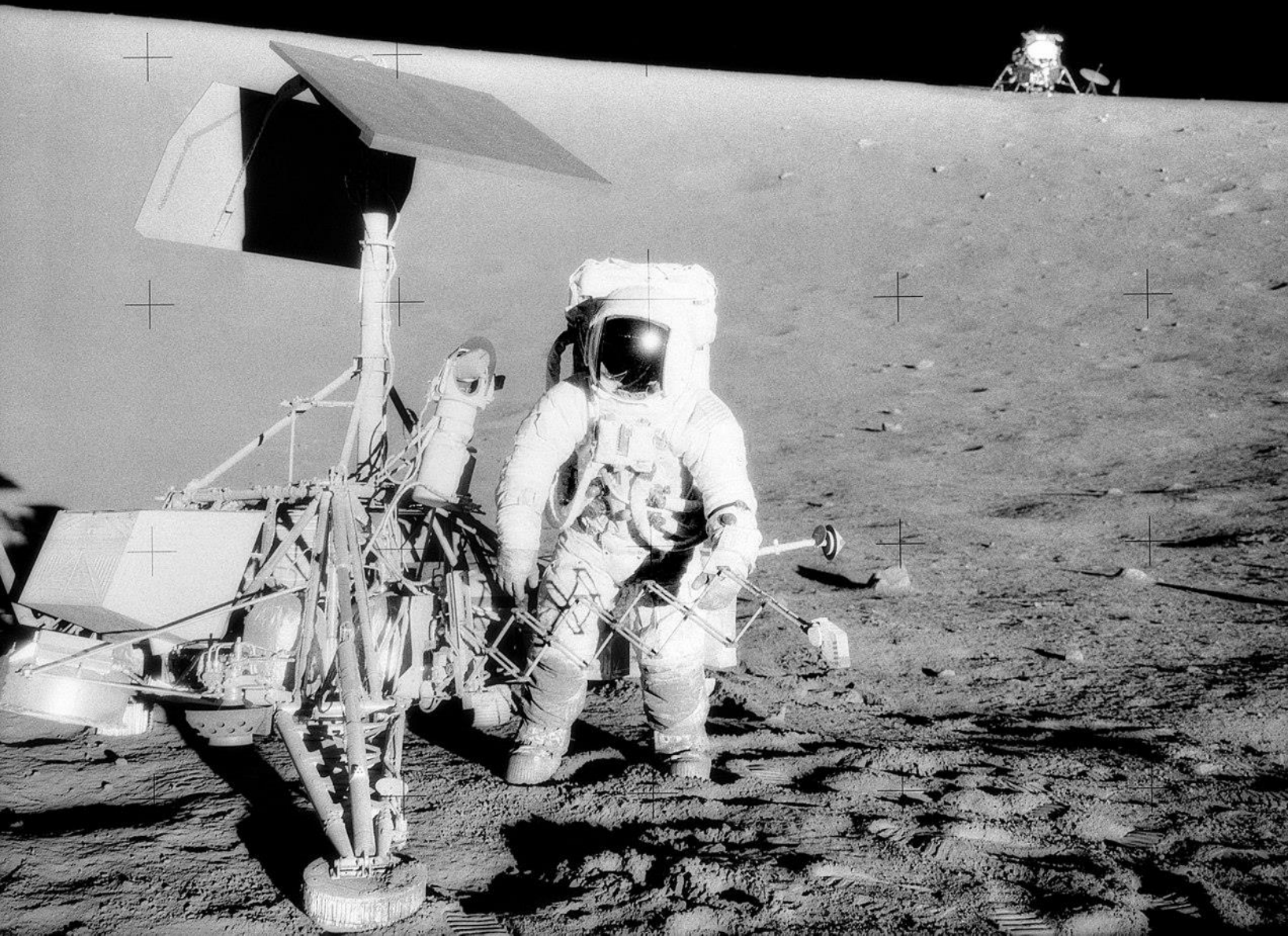
NASA's Solar Dynamics Observatory came across an oddity that the spacecraft has rarely observed before: a dark filament encircling an active region of the sun. Solar filaments are clouds of charged particles that float above the sun, tethered to it by magnetic forces. They are usually elongated and uneven strands. Only a handful of times before have we seen one shaped like a circle. The black area to the left of the brighter active region is a coronal hole, a magnetically open region of the sun.

Laser Weapons May Arm Air Force Fighter Jets



U.S. Air Force fighter jets may soon be able to instantly disable enemy targets using invisible, energized beams of light shot from a small, compact laser cannon. On Nov 6th, the U.S. Air Force Research Lab signed a \$26.3 million contract with Lockheed Martin to develop high-energy laser weapons that are lightweight and compact enough to be mounted on fighter jets. Lockheed Martin conducted flight tests in 2015 with laser-equipped research planes (picture) to determine whether mounting powerful lasers on planes was feasible.

Nov 14 → 24, 1969 – Apollo 12 Mission



Apollo 12, the second manned mission to land on the Moon, was planned and executed as a precision landing. The space vehicle with a crew of Charles (Pete) Conrad, Jr., the commander; Richard F. Gordon, the command module pilot; and Alan L. Bean, the lunar module pilot, was launched from Kennedy Space Center, Fla on Nov. 14, 1969. On Nov 19th, Pete Conrad and Al Bean landed the Lunar Module within walking distance of the Surveyor III spacecraft which had landed on the Moon in April of 1967. The astronauts brought instruments from Surveyor III back to Earth to examine the effects of long-term exposure to the lunar environment. Apollo 12 splashed down in the Pacific on Nov 24th near American Samoa and was recovered by the U.S.S. Hornet.

Source: airandspace.si.edu

Image Credit: NASA

November 15, 1916 - Boeing Model "C" 1st Flight



The Model C two-place training seaplane was the first "all Boeing" design and the company's first financial success. A total of 56 C-type trainers were built. Fifty-five used twin pontoons. The Model C-1F had a single main pontoon and small auxiliary floats under each wing and was powered by a Curtiss OX-5 engine. The U.S. Navy bought 51 of the Model C trainers, including the C-1F, and the Army bought two landplane versions with side-by-side seating, designated the EA. The final Model C was built for William Boeing and called the C-700 (the last Navy plane had been Navy serial number 699). Boeing and Eddie Hubbard flew the C-700 on the first international mail delivery from Vancouver, B.C., to Seattle, Wash., on March 3, 1919.

Replica of Boeing Model C now on display in the Tainan-based National Cheng Kung University (NCKU) Museum

Photo Source: <http://news-en.secr.ncku.edu.tw>

Text: Boeing.history.com

In The News



Boeing Bags Breakthrough 787-10 Commitment from Emirates. Emirates Airline resumed its tradition of bucking trends yesterday by committing to an order for 40 Boeing 787-10s worth an estimated \$15.1 billion based on list prices, giving the U.S. airframer a major breakthrough in the region for its Dreamliner family with the Middle East's biggest airline. Emirates explained that fleet planners looked closely at both options and reached the conclusion that the Boeing product made the most sense for several reasons, including maintenance cost considerations. *(Gregory Polek @ AINonline.com)*



Emirates Seeks Assurances Over A380 Continuity. Emirates is unlikely to conclude an Airbus A380 agreement during the Dubai air show, as the two sides continue a chicken-and-egg wrangle over commitments to the double-deck aircraft's production line. Emirates Airline president Tim Clark says the carrier is seeking undertakings that the line would continue for 10-15 years, adding that the airline's ownership is "concerned" that further commitments would "not be [put] at risk" if the line is discontinued. *(FlightGlobal.com)*



NASA Moves Up Critical Crew Safety Launch Abort Test. NASA's Orion spacecraft is scheduled to undergo a design test in April 2019 of the capsule's launch abort system (LAS), which is a rocket-powered tower on top of the crew module built to very quickly get astronauts safely away from their launch vehicle if there is a problem during ascent. NASA is accelerating the timeline of the test to provide engineers with critical abort test data sooner to help validate computer models of the spacecraft's LAS performance and system functions. *(NASA.gov)*



Virgin Galactic Wants to Send People on Superfast Trips Across Earth. Suborbital space tourism and research may be just the beginning for Virgin Galactic. The private spaceflight company eventually aims to add superfast point-to-point passenger flights to its repertoire, which would dramatically reduce the time needed to get from Boston to Beijing or Sydney to San Francisco, according to Virgin Galactic CEO George Whitesides. *(Mike Wall @ Space.com)*



Title. SpaceX said that it suffered a failure of a Merlin engine during a recent test at its Texas facility, but that the incident would not delay any upcoming launches. The incident, which took place Nov. 4th may have involved a new version of the Merlin engine being developed by SpaceX for the next upgrade of the company's Falcon 9 launch vehicle. *(Jeff Foust @ SpaceNews.com)*