The Aerospace Update

LIFTOFF of Falcon 9 with GRACE-FO & Iridium Satellites

May 24, 2018

Image Credit: NASA/Bill Ingalls

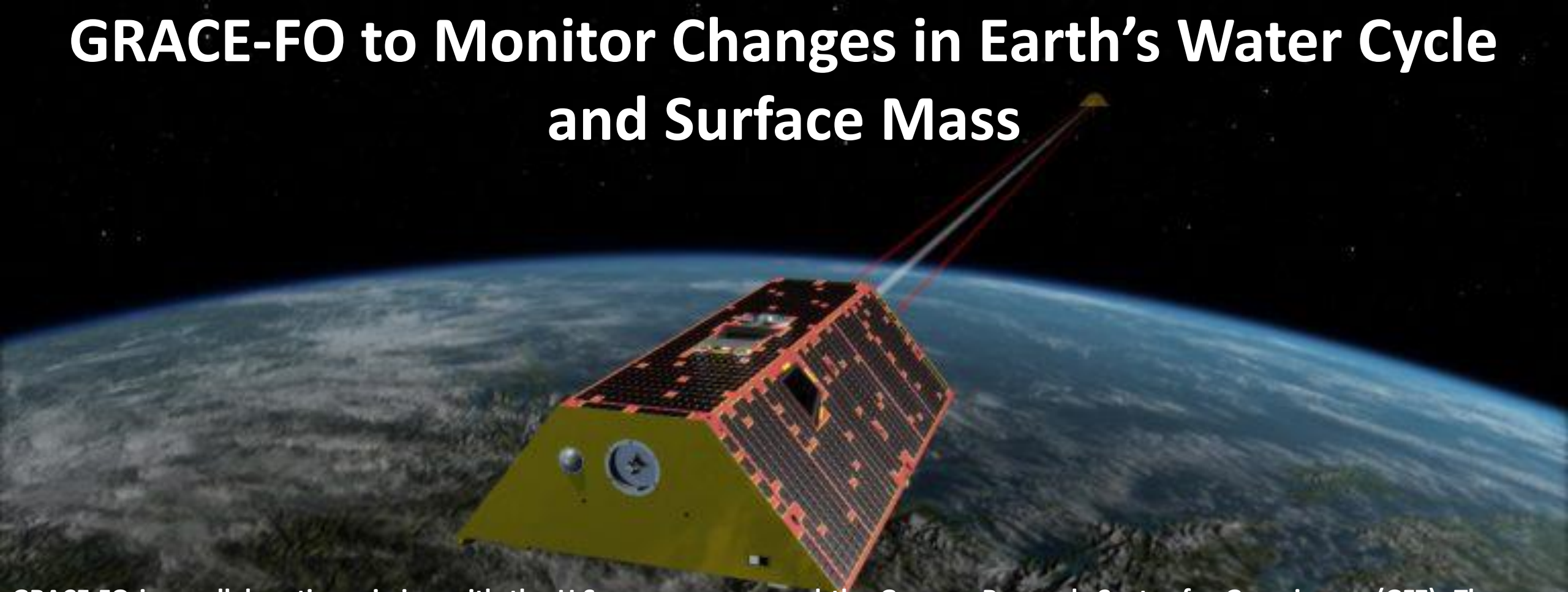
SpaceX Launches Grace-FO & Iridium Satellites

Video Credit: NASA/JPL-Cal-Tech

A SpaceX Falcon 9 rocket lifted off Tuesday, May 22nd with two Gravity Recovery and Climate Experiment Follow-On satellites (GRACE-FO) which will monitor Earth's water cycle along with five Iridium NEXT communications satellites in a unique rideshare arrangement. Launch was from Vandenberg Air Force Base, California. Although no attempt was made to recover the 1st stage booster, an attempt was made to recover the payload fairings. SpaceX says the payload fairing halves jettisoned from the Falcon 9 rocket deployed their parachutes and fell into the Pacific Ocean. The company's fairing recovery vessel, "Mr. Steven," was in position in the fairing drop zone, but narrowly missed catching the fairings with its net.

Source: SpaceFlightNow.com

GRACE-FO to Monitor Changes in Earth's Water Cycle and Surface Mass



GRACE-FO is a collaborative mission with the U.S. space agency and the German Research Centre for Geosciences (GFZ). They are designed to fly in tandem some 137 miles apart and monitor changes in Earth's water cycle and surface mass. As its name suggests, the mission is a follow-on to the GRACE mission, which operated between 2002 and 2017 to measure gravity anomalies to understand Earth's ocean, geology and climate. The GRACE-FO design is similar to the original mission and features laser ranging technology in addition to the microwave ranging system used on the original to precisely measure the distance between the two spacecraft. As the twin GRACE-FO satellites fly over areas of higher and lower mass, the distance between the two spacecraft will chance ever-so-slightly. By precisely measuring these changes, the distribution of Earth's mass can be mapped monthly and tracked over time. This data can be used to monitor changes in ice sheets and glaciers, underground water storage, water in large lakes and rivers, and sea level, providing a unique view of Earth's evolving climate and its water and energy cycles.

Source: Derek Richardson @ SpaceFlightInsider.com

Image Credit: NASA

Iridium Next Constellation Grows to 55

The May 22st launch grows the constellation to 55 Iridium Next satellites in orbit. Iridium anticipates completing the Iridium Next constellation by this fall. The full constellation is to consist of 66 operational satellites, nine in-orbit spares and six ground spares. Iridium spent around $3 billion on Iridium Next, purchasing the satellites from Thales Alenia Space in Europe. Orbital ATK integrated the satellites at its Gilbert, Arizona, factory.

Source: Caleb Henry and Jeff Foust @ SpaceNews.com

Image Credit: Thales Alenia Space

NASA Sends New Research on Orbital ATK Mission to Space Station

Video Courtesy of NASA

The Orbital ATK Antares rocket, with the Cygnus spacecraft onboard, launched May 21st from NASA's Wallops Flight Facility in Virginia. Orbital ATK's ninth contracted cargo resupply mission with NASA to the ISS will deliver approximately 7,400 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew.

Source: NASA

NASA Is Launching a Box of Lasers to Make the Coldest Spot In the Universe

With one of the experiments launching to the ISS on Cygnus, scientists will be able to create a temperature that's 10 billion times colder than the vacuum of space to focus in on atoms' weird quantum behavior. The Cold Atom Laboratory (CAL) is a physics research facility the size of an ice chest, designed and built by NASA's Jet Propulsion Laboratory (JPL) in California, that will chill clouds of atoms with lasers and magnets aboard the space station to this ultracold temperature — close to absolute zero, or the lowest temperature possible. In using CAL to study the atoms' quantum activity, physicists will be able to better understand how atoms behave at these extreme temperatures, a main thread in physics for over a century.

Source: Chelsea Gohd @ Space.com

Image Credit: NASA/iGoal Animation

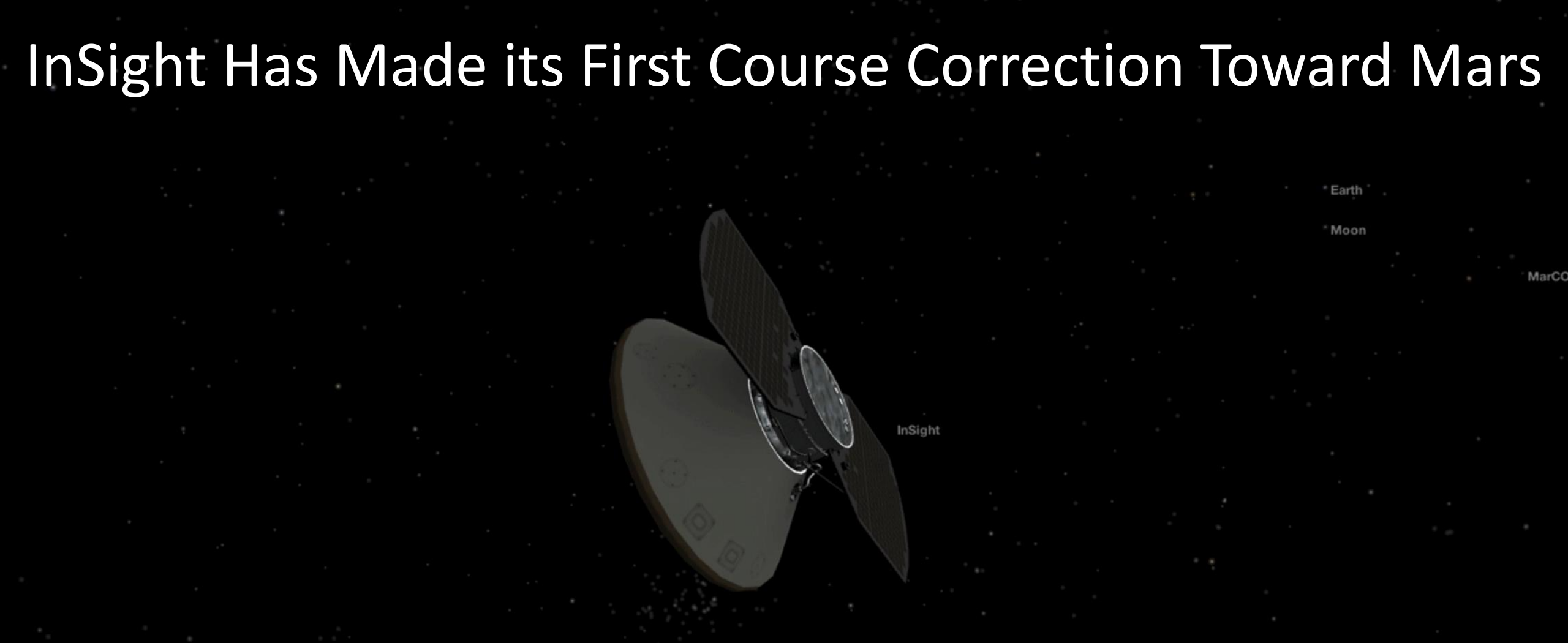
Long March 4C Sends Chang’e 4 Relay Satellite Toward Moon

Video Credit: China Central Television

Using a Long March 4C rocket, China launched the first spacecraft of its Chang’e 4 lunar mission along with two smaller satellites. The booster lifted off on May 20st from the Xichang Satellite Launch Center in the country’s Sichuan Province.
The rocket carried the Queqiao communication relay satellite planned to be delivered to the Earth-Moon L2 Lagrangian Point located some 280,000 miles (450,000 kilometers) directly “behind” Earth as viewed from the Sun, or some 37,000 miles (60,000 kilometers) beyond the far side of the Moon. The secondary payload for the mission consists of two radio astronomy satellites, known as DSLWP-A1 and A2, which are embarking on a trip to lunar orbit.

Source: Tomasz Nowakowski @ SpaceFlightInsider.com

InSight Has Made its First Course Correction Toward Mars



Precise calculations are required for InSight to arrive at exactly the right spot in Mars' atmosphere at exactly the right time, resulting in a landing on Nov. 26. Every step of the way, a team of navigators estimates the position and velocity of the spacecraft. Then they design maneuvers to deliver it to an entry point at Mars. That navigation team is based at NASA's Jet Propulsion Laboratory in Pasadena, California, which leads the InSight mission. "This first maneuver is the largest we'll conduct," said Fernando Abilleira of JPL, InSight's Deputy Mission Design and Navigation Manager. "The thrusters fired for about 40 seconds to impart a velocity change of 3.8 meters per second [8.5 mph] to the spacecraft. That will put us in the right ballpark as we aim for Mars."

Source & Animation Credits: NASA/JPL-Caltech

TESS Snaps 1st Photo

NASA's next planet hunter, the Transiting Exoplanet Survey Satellite (TESS) snapped a two-second test exposure using one of the four TESS cameras As part of camera commissioning. The image, centered on the southern constellation Centaurus, reveals more than 200,000 stars. The edge of the Coalsack Nebula is in the right upper corner and the bright star Beta Centauri is visible at the lower left edge. TESS is expected to cover more than 400 times as much sky as shown in this image with its four cameras during its initial two-year search for exoplanets. A science-quality image, also referred to as a "first light" image, is expected to be released in June.

Source & Image Credits: NASA/MIT/TESS

Ant Nebula Blasts Lasers Suggesting Hidden Double-Star System

Using ESA's Herschel Space Observatory, astronomers observed a rare type of laser emission from the Ant Nebula, also known as Menzel 3, located between 3,000 and 6,000 light-years from Earth. Such emissions require very dense gas close to the star, according to the statement. The new observations show that the density of the laser-emitting gas surrounding the Ant Nebula is 10,000 times higher than that of the gas seen in typical planetary nebulas. This finding suggests that the Ant Nebula is actually home to two stars, since a companion star would help capture the dense gas ejected from the dying white dwarf star.

Source: Samantha Mathewson @ Space.com

Image Credit: NASA/ESA/Hubble Heritage Team

ESA Eyes Venus Mission or Space Telescope to Launch by 2030

We may soon be on our way to Venus. A mission to our neighboring planet is one of three finalists in the running to be the European Space Agency's next vision in its Cosmic Vision Program. The other two contenders are a space telescope that will hunt for bursts of energy from the early universe and a space observatory that can peer through interstellar dust to watch stars being born. Seen here is the Infrared Telescope for Cosmology and Astrophysics (SPICA). These three missions were selected out of 25 proposals for further study over the next few years.

Leah Crane @ newscientist.com

Image Credit: ESA

NOAA's New GOES-17 Weather Satellite has Degraded Night Vision

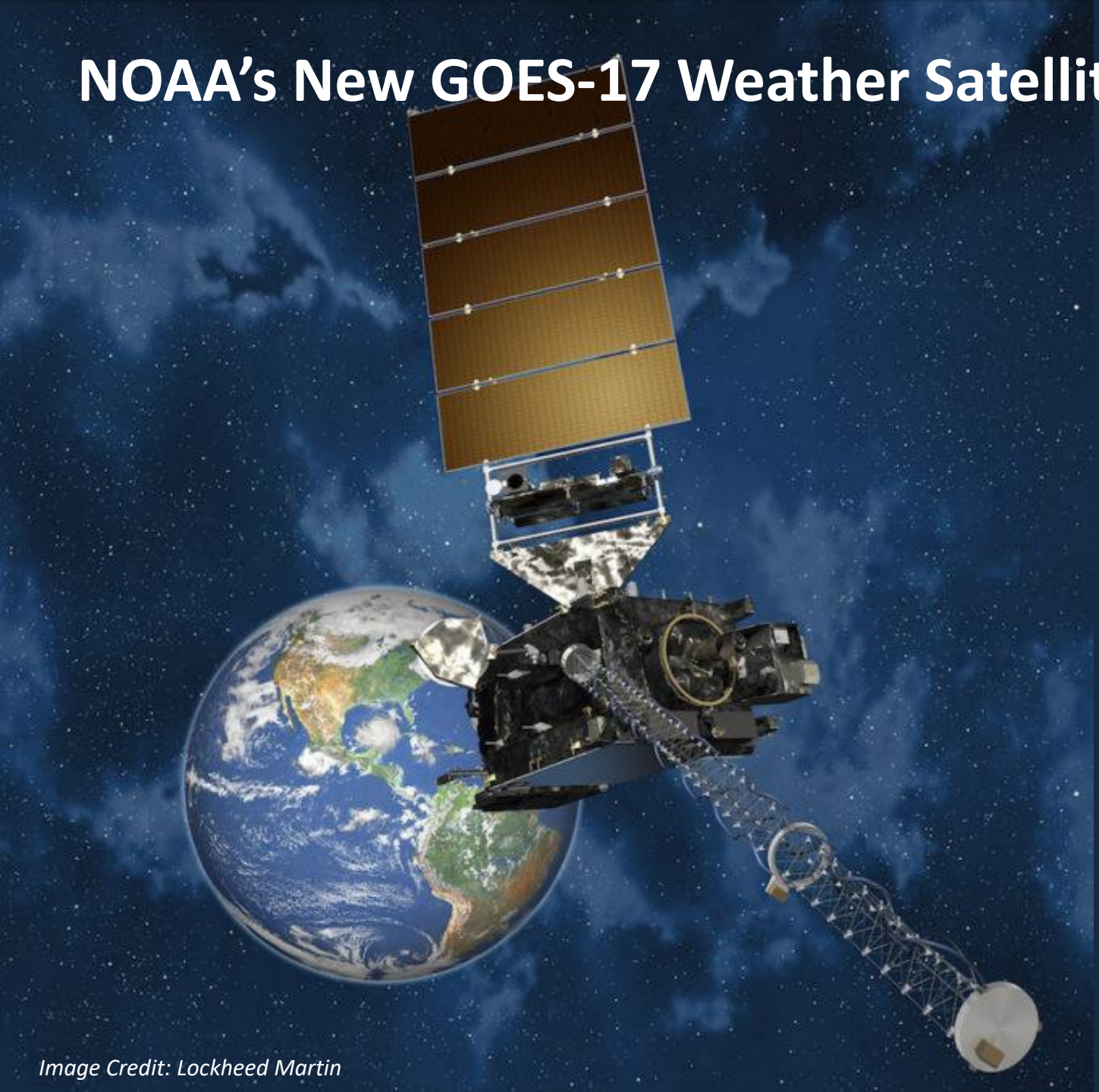


Image Credit: Lockheed Martin

Engineers are studying a malfunction with the main imaging instrument on NOAA's GOES-17 weather satellite, launched March 1st, that could limit the observatory's ability to monitor storms, winds and other weather phenomena at night. A cooling system aboard the satellite is unable to chill infrared detectors inside the Advanced Baseline Imager on GOES-17 to proper temperatures, degrading the camera's performance. The imager is designed to be sensitive to light in 16 channels, including 13 infrared and near-infrared wavelengths, and three colors in the visible spectrum. The thermal control anomaly currently under investigation affects the 13 infrared and near-infrared channels. Detectors for the infrared channels must be cooled to around 60 Kelvin (minus 351 degrees Fahrenheit) to make them fully sensitive to infrared light coming from Earth's atmosphere. For about 12 hours each day, the cooler inside the Advanced Baseline Imager, or ABI, is unable to chill the detectors to such cold temperatures.

Source: Stephen Clark @ SpaceFlightNow.com

Drilling Success: Curiosity is Collecting Mars Rocks

Image Credit: NASA

Engineers working with NASA's Curiosity Mars rover have been hard at work testing a new way for the rover to drill rocks and extract powder from them. This past weekend, that effort produced the first drilled sample on Mars in more than a year. Curiosity tested percussive drilling this past weekend, penetrating about 2 inches (50 millimeters) into a target called "Duluth." NASA's Jet Propulsion Laboratory in Pasadena, California, has been testing this drilling technique since a mechanical problem took Curiosity's drill offline in December of 2016. Drilling is a vitally important part of Curiosity's capabilities to study Mars. Inside the rover are two laboratories that are able to conduct chemical and mineralogical analyses of rock and soil samples. This image was taken by Curiosity's Mast Camera (Mastcam) on Sol 2057.

Source: Andrew Good @ NASA/JPL

Zunum Aero’s Hybrid-Electric Aircraft Gets a Launch Customer

Kirkland-based Zunum Aero announced Monday that private-jet-charter provider JetSuite will be the launch customer for its small hybrid-electric aircraft slated for delivery in 2022. JetSuite will take up to 100 of Zunum’s aircraft . Zunum, a startup that’s won funding from both Boeing and the state of Washington, is developing a plane, mostly built of composites, with Tesla-style battery packs in the wings. As a hybrid, it will also carry a relatively small amount of fuel. Zunum’s initial airplane design would theoretically seat up to a dozen people, but since FAA rules require two pilots for 10 or more passengers, in practice, it’ll be a nine-seater in the U.S.

Source: Dominic Gates @ SeattleTimes.com

Image Credit: Zunum Aero

In The News

Safety Panel Considers SpaceX "Load-and-Go" Fueling Approach Viable. Members of a NASA safety panel said May 17 they believed that a SpaceX approach for fueling its Falcon 9 rockets known as "load-and-go" could be used for future commercial crew missions. That sequence has been a topic of controversy because of SpaceX's preference to use an approach called "load-and-go" where astronauts would first board the Crew Dragon spacecraft before the rocket is loaded with RP-1 and liquid oxygen propellants. SpaceX has preferred that approach because of its use of dense supercooled propellants, which need to be loaded on the vehicle shortly before launch. *(Jeff Foust @ Spacenews.com)*

Study Offers Pessimistic Outlook for Commercial Space Stations. As NASA formally requests proposals for studies on the commercialization of low Earth orbit, another study presented at a congressional hearing May 17 concludes commercial space stations are unlikely to be financially viable in the mid-2020s. Bill Gerstenmaier, NASA associate administrator for human exploration and operations, said at the hearing that the studies will help NASA provide more details about its ISS transition plan, including maintaining a post-ISS presence of some kind in LEO. *(Jeff Foust @ Spacenews.com)*

Boeing's Folding Wingtips Get the FAA Green Light . Boeing received FAA approval today for its folding wingtips for the new 777X, which will let the planes stop at airport gates big enough to accommodate older 777 models. Once the 777X lands, the wingtips will rotate until they point upwards. The new wings are made from carbon-fiber composites that are stronger and lighter than the metal Boeing uses in other wings which have been increased in span from width by 23 feet to 235 feet. *(Kris Holt @ Engadget.com)*

Iridium Breaks Inmarsat Monopoly on Maritime Safety Communications. The UN certified Iridium Communications to provide Global Maritime Distress Safety System (GMDSS) services, ending Inmarsat's monopoly on the internationally required service for ships, Iridium said May 21. The certification, granted by the UN's International Maritime Organization, marks the culmination of a five-year effort that occasionally turned nasty between fleet operators Iridium and Inmarsat. *(Caleb Henry @ SpaceNews.com)*

Boeing marks 737 Max anniversary with 130-strong fleet. Boeing has passed the one-year anniversary of the 737 Max with a staggeringly large in-service fleet that has fulfilled promises of improved fuel efficiency while battling normal teething problems. Boeing delivered 130 aircraft representing two versions of the 737 Max in the 12 months since first delivery to Lion Air's Malaysia-based subsidiary last May *(Stephen Trimble @ FlightGlobal.com)*