Space News Update

— April 28, 2017 —

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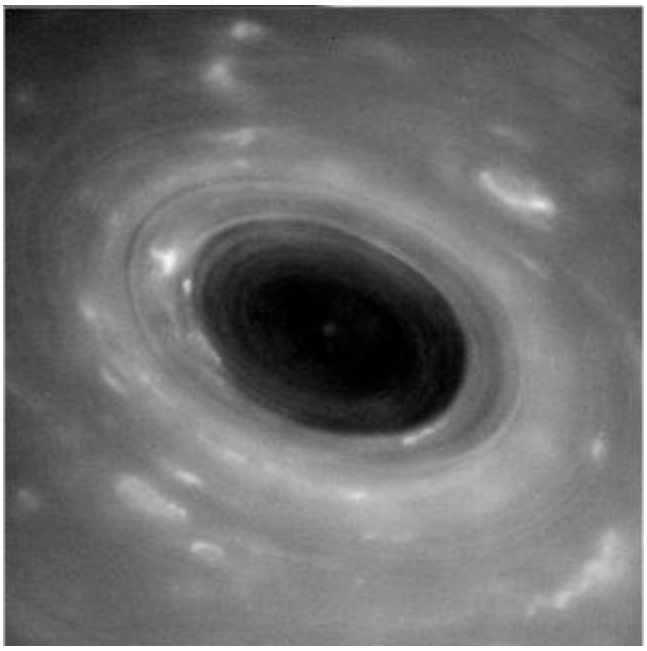
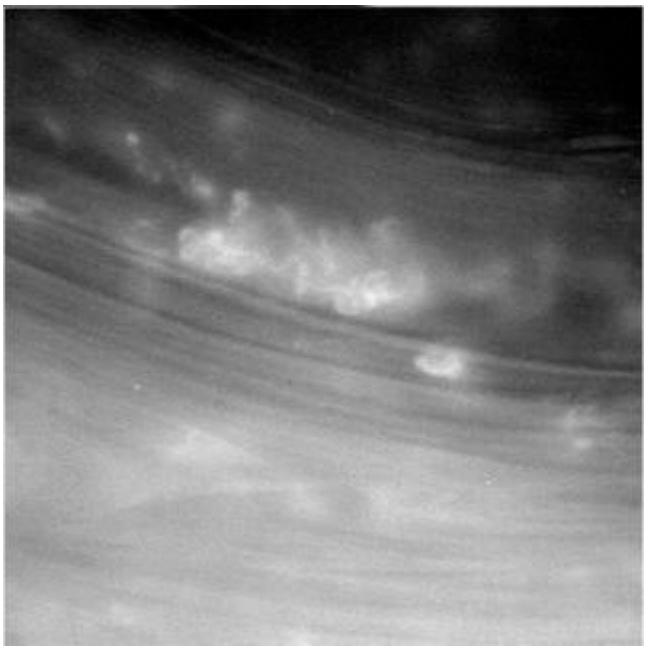
1. NASA Spacecraft Dives Between Saturn and Its Rings





NASA's Cassini spacecraft is back in contact with Earth after its successful first-ever dive through the narrow gap between the planet Saturn and its rings on April 26, 2017. The spacecraft is in the process of beaming back science and engineering data collected during its passage, via NASA's Deep Space Network Goldstone Complex in California's Mojave Desert. The DSN acquired Cassini's signal at 11:56 p.m. PDT on April 26, 2017 (2:56 a.m. EDT on April 27) and data began flowing at 12:01 a.m. PDT (3:01 a.m. EDT) on April 27.

"In the grandest tradition of exploration, NASA's Cassini spacecraft has once again blazed a trail, showing us new wonders and demonstrating where our curiosity can take us if we dare," said Jim Green, director of the Planetary Science Division at NASA Headquarters in Washington.

As it dove through the gap, Cassini came within about 1,900 miles (3,000 kilometers) of Saturn's cloud tops (where the air pressure is 1 bar -- comparable to the atmospheric pressure of Earth at sea level) and within about 200 miles (300 kilometers) of the innermost visible edge of the rings.

While mission managers were confident Cassini would pass through the gap successfully, they took extra precautions with this first dive, as the region had never been explored.

"No spacecraft has ever been this close to Saturn before. We could only rely on predictions, based on our experience with Saturn's other rings, of what we thought this gap between the rings and Saturn would be like," said Cassini Project Manager Earl Maize of NASA's Jet Propulsion Laboratory in Pasadena, California. "I am delighted to report that Cassini shot through the gap just as we planned and has come out the other side in excellent shape."

The gap between the rings and the top of Saturn's atmosphere is about 1,500 miles (2,000 kilometers) wide. The best models for the region suggested that if there were ring particles in the area where Cassini crossed the ring plane, they would be tiny, on the scale of smoke particles. The spacecraft zipped through this region at speeds of about 77,000 mph (124,000 kph) relative to the planet, so small particles hitting a sensitive area could potentially have disabled the spacecraft.

As a protective measure, the spacecraft used its large, dish-shaped high-gain antenna (13 feet or 4 meters across) as a shield, orienting it in the direction of oncoming ring particles. This meant that the spacecraft was

out of contact with Earth during the ring-plane crossing, which took place at 2 a.m. PDT (5 a.m. EDT) on April 26. Cassini was programmed to collect science data while close to the planet and turn toward Earth to make contact about 20 hours after the crossing.

Cassini's next dive through the gap is scheduled for May 2.

Launched in 1997, Cassini arrived at Saturn in 2004. Following its last close flyby of the large moon Titan on April 21 PDT (April 22 EDT), Cassini began what mission planners are calling its "Grand Finale." During this final chapter, Cassini loops Saturn approximately once per week, making a total of 22 dives between the rings and the planet. Data from this first dive will help engineers understand if and how they will need to protect the spacecraft on its future ring-plane crossings. The spacecraft is on a trajectory that will eventually plunge into Saturn's atmosphere -- and end Cassini's mission -- on Sept. 15, 2017.

More information about Cassini's Grand Finale, including images and video, is available at:

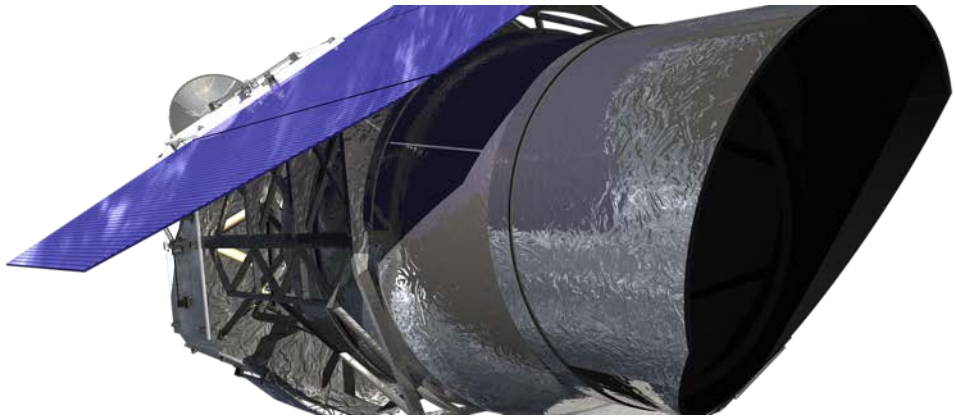
https://saturn.jpl.nasa.gov/grandfinale and https://saturn.jpl.nasa.gov/mission/grand-finale/why-cassini-matters/.

The Cassini-Huygens mission is a cooperative project of NASA, ESA (European Space Agency) and the Italian Space Agency. JPL, a division of Caltech in Pasadena, California, manages the mission for NASA's Science Mission Directorate. JPL designed, developed and assembled the Cassini orbiter.

More information about Cassini is at http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov.

Source: NASA Return to Contents

2. NASA Taking a Fresh Look at Next Generation Space Telescope Plans



NASA is initiating an independent, external review over the next several months on the scope of the Wide Field Infrared Survey Telescope (WFIRST) project to help ensure it would provide compelling scientific capability with an appropriate, affordable cost and a reliable schedule.

“Developing large space missions is difficult,” said Thomas Zurbuchen, Associate Administrator for NASA’s Science Mission Directorate in Washington. “This is the right time for us to pause for an independent look at our plans to make sure we understand how long it will take, and how much it will cost, to build WFIRST.”

WFIRST is NASA’s next large space telescope under development, after the James Webb Space Telescope that is launching in 2018.

NASA has launched a series of large space telescopes over the past 27 years, including the Hubble Space Telescope, the Chandra X-ray Observatory, and the Spitzer Space Telescope. In addition to being among the most productive science facilities ever built, all of these space telescopes share something else: They were all top recommendations of a National Academy of Sciences’ Decadal Survey for Astronomy and Astrophysics.

WFIRST, the top priority of the most recent Decadal Survey in 2010, would be as sensitive as the Hubble Space Telescope, but have 100 times its field of view; every WFIRST image would be like 100 Hubble images. It also would feature a demonstration instrument capable of directly detecting the reflected light from planets orbiting stars beyond the sun. Using these capabilities, WFIRST would study the dark energy that is driving the accelerating expansion of the universe, complete the demographic survey of planets orbiting other stars, answer questions about how galaxies and groups of galaxies form, study the atmospheres and compositions of planets orbiting other stars, and address other general astrophysics questions.

Recently, the National Academies conducted a midterm assessment of NASA’s progress in implementing the recommendations of the 2010 Decadal Survey. The Midterm Assessment Report recognized the continued compelling science value of WFIRST, finding that, “WFIRST [is] an ambitious and powerful facility that will significantly advance the scientific program envisioned by [the Decadal Survey], from the atmospheres of planets around nearby stars to the physics of the accelerating universe.”

The agency initiated the WFIRST project in 2016, beginning the formulation phase of the mission. Recognizing that cost growth in the planned WFIRST project could impact the balance of projects and research investigations across NASA’s astrophysics portfolio, the Midterm Assessment Report recommended that prior to proceeding to the next phase of the WFIRST project, “NASA should commission an independent technical, management, and cost assessment of the Wide-Field Infrared Survey Telescope, including a quantitative assessment of the incremental cost of the coronagraph.”

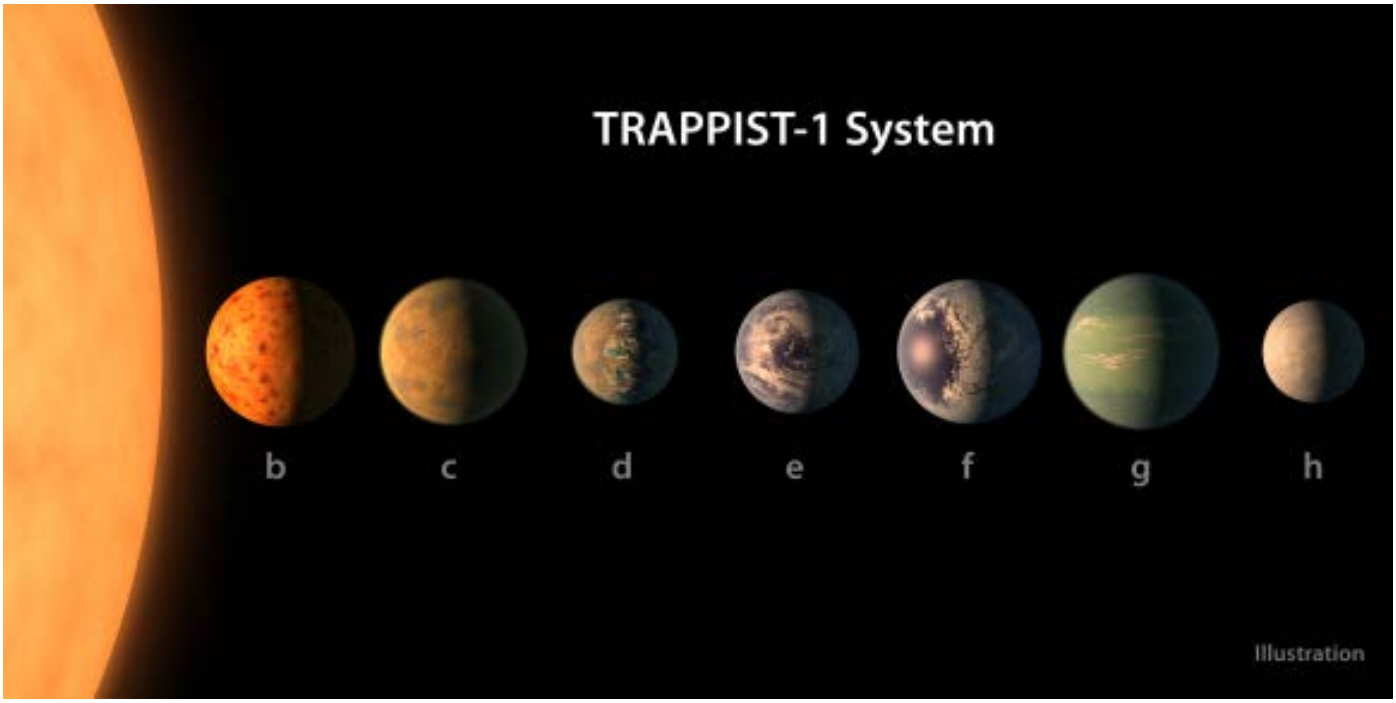
NASA conducted an analogous independent review of the James Webb Space Telescope, but conducted it later in its development lifetime. That review resulted in a replan of the Webb development project in 2011, and the Webb project has remained within the replan cost and schedule ever since.

“NASA is a learning organization,” said Zurbuchen. “We are applying lessons we learned from Webb on WFIRST. “By conducting this review now, we can define the best way forward for this mission and the astrophysics community at large, in accordance with the academy guidance.”

The review panel members will be senior engineers, scientists, and project managers mostly from outside NASA who are independent of the WFIRST project. NASA will begin the review process after filling the review panel membership during the next few weeks. The panel is expected to complete its review and submit a report outlining its findings and recommendations within approximately two months. NASA intends to incorporate these recommendations into its design and plans for WFIRST before proceeding with development of the mission.

Source: NASA Return to Contents

3. TRAPPIST-1 System Ideal For Life Swapping



Back in February of 2017, NASA announced the discovery of a seven-planet system orbiting a nearby star. This system, known as TRAPPIST-1, is of particular interest to astronomers because of the nature and orbits of the planets. Not only are all seven planets terrestrial in nature (i.e. rocky), but three of the seven have been confirmed to be within the star's habitable zone (aka. "Goldilocks Zone").

But beyond the chance that some of these planets could be inhabited, there is also the possibility that their proximity to each other could allow for life to be transferred between them. That is the possibility that a team of scientists from the University of Chicago sought to address in a new study. In the end, they concluded that bacteria and single-celled organisms could be hopping from planet to planet.

This study, titled "Fast Litho-panspermia in the Habitable Zone of the TRAPPIST-1 System", was recently published in the *Astrophysical Journal Letters*. For the sake of seeing if life could be distributed within this star system (aka. litho-panspermia), Krijt and his fellow UChicago scientists ran simulations that showed that this process could happen 4 to 5 times faster than it would in our Solar System.

As Sebastiaan Krijt – a postdoctoral scholar at UChicago and the lead author on the study – said in a University press release:

"Frequent material exchange between adjacent planets in the tightly packed TRAPPIST-1 system appears likely. If any of those materials contained life, it's possible they could inoculate another planet with life."

For the sake of their study, the team considered that any transfers of life would likely involve asteroids or comets striking planets within the star's habitable zone (HZ) and then transferring the resulting material to other planets. They then simulated the trajectories that the ejecta would take, and tested to see if it would have the necessary speed to get out of orbit (escape velocity) and be captured by a neighboring planet's gravity.

In the end, they determined that roughly 10% of the material that would be capable of transferring life would have the velocity necessary to not only achieve escape velocity. This covered the pieces of ejecta that would

be large enough to endure irradiation and the heat of re-entry. What's more, they found that this material would be able to reach another HZ planet with periods ranging from 10 to 100 years.

For over a century, scientists have considered the possibility that life may be distributed throughout our Universe by meteoroids, asteroids, comets, and planetoids. Similarly, multiple studies have been conducted to see if the building blocks of life could have come to Earth (and been distributed throughout the Solar System) in the same way.

Every year, an estimated 36,287 metric tons (40,000 tons) of space debris falls to Earth, and material that has been ejected from our planet is floating around out in space as well. And we know for a fact that Earth and Mars have exchanged material on several occasions, where Martian ejecta kicked up by asteroids and comets was thrown into space and eventually collided with our planet.

As such, studies like this can help us to understand how life came to be in our Solar System. At the same time, they can illustrate how in other star systems, the process may be far more intense. As Fred Ciesla – a professor of geophysical sciences at UChicago and a co-author of the paper – explained:

"Given that tightly packed planetary systems are being detected more frequently, this research will make us rethink what we expect to find in terms of habitable planets and the transfer of life—not only in the TRAPPIST-1 system, but elsewhere. We should be thinking in terms of systems of planets as a whole, and how they interact, rather than in terms of individual planets."

And with all the exoplanets discoveries made of late – which can only be described as explosive – opportunities for research are similarly exploding. In total, some 3,483 exoplanets have been confirmed so far, with an additional 4,496 candidates awaiting confirmation. Of the confirmed planets, 581 have been found to exist within multi-planet systems (like TRAPPIST-1), each of which present the possibility of litho-panspermia.

By studying more and more in the way of distant planets, we can reach beyond our own Solar System to see how planets evolve, interact, and how life can come to exist on them. And someday, we may actually be able to study them up close! One can only imagine what we may find...

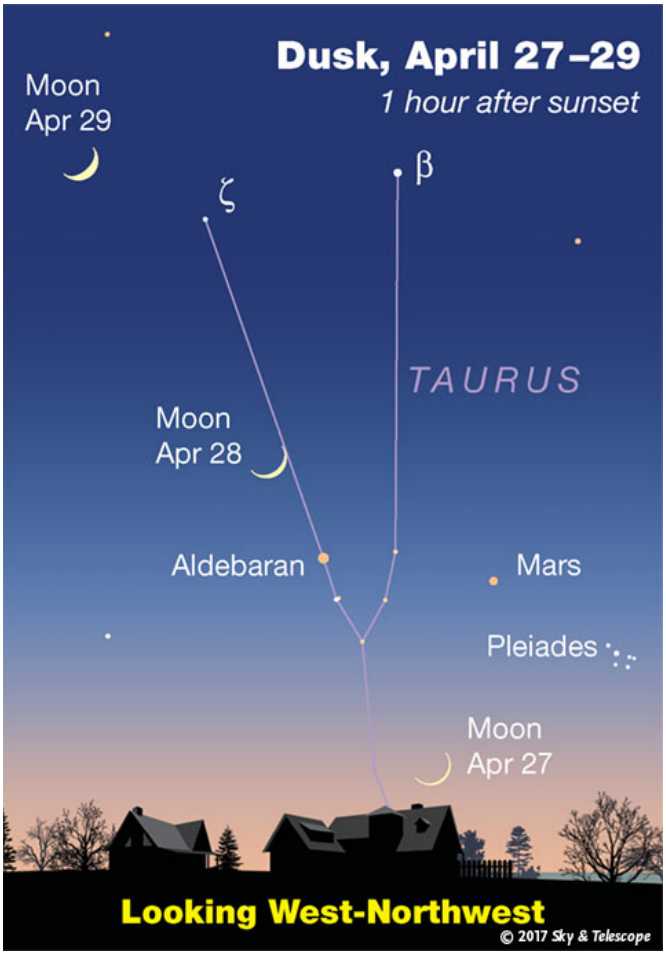
Further Reading: University of Chicago, Astrophysical Journal Letters

Source: Universe Today Return to Contents

The Night Sky

Friday, April 28

• As twilight fades in the west, spot Aldebaran and Mars to the lower right of the crescent Moon, as shown here.



Saturday, April 29

• Now the curve of the crescent Moon points far down toward Aldebaran and Mars at dusk, as shown here. And the horns of Taurus, Zeta and Beta Tauri, occupy roughly the same stances with respect to the Moon as Aldebaran and Mars did last night.

Sunday, April 30

• These spring evenings, the long, dim sea serpent Hydra snakes far across the southern sky. Find his head, a rather dim asterism about the width of your thumb at arm's length, in the southwest. (It's lower right of Regulus by about two fists at arm's length.) His tail reaches all the way to Libra rising in the southeast. Hydra's star pattern, from forehead to tail-tip, is 95° long.

Monday, May 1

• As twilight fades, look above the crescent Moon in the west for Pollux and Castor, and a similar distance left of the Moon for Procyon.

• It's May now. But wintry Sirius still twinkles very low in the west-southwest in twilight, far below Procyon. It sets soon after dusk. How much longer into the spring can you keep Sirius in view each evening? In other words, what will be its date of "heliacal setting" as seen by you?

Tuesday, May 2

• At nightfall, the first-quarter Moon forms part of a gigantic curving arc: To the Moon's lower left is Procyon, to its upper right are Pollux and Castor, and continuing way farther right, you can include Menkalinan and then brilliant Capella. These stars alone, minus the Moon, form the Arch of Spring.

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver: No sightings

Sighting information for other cities can be found at NASA's Satellite Sighting Information

NASA-TV Highlights

(all times Eastern Daylight Time)

Friday, April 28 –

11 a.m., JSC Presents "SpaceCast Weekly"JSC Presents "SpaceCast Weekly" (all channels)

8 p.m., Replay of SpaceCast Weekly (all channels)

Monday, May 1

12 p.m., ISS Expedition 51 In-Flight Event with CNN Digital News and KUSA-TV, Denver and ISS Commander Peggy Whitson and Flight Engineer Jack Fischer of NASA (starts at 12:20 p.m.) (all channels)

Watch NASA TV on the Net by going to the NASA website. Return to Contents

Space Calendar

- Apr 28 - Mercury Passes 0.15 Degrees From Uranus
- Apr 28 - Moon Occults Aldebaran
- Apr 28 - Comet P/2013 R3 (Catalina-PANSTARRS) At Opposition (2.478 AU)
- Apr 28 - Aten Asteroid 2016 HF2 Near-Earth Flyby (0.090 AU)
- Apr 28 - Apollo Asteroid 469219 (2016 HO3) Closest Approach To Earth (0.139 AU)
- Apr 28 - Atira Asteroid 413563 (2005 TG45) Closest Approach To Earth (0.532 AU)
- Apr 28 - Asteroid 7367 Giotto Closest Approach To Earth (1.821 AU)
- Apr 28 - Asteroid 3768 Monroe Closest Approach To Earth (2.700 AU)
- Apr 29 - 

[Apr 22] Astronomy Day
- Apr 29 - Comet 73P-AG/Schwassmann-Wachmann Perihelion (0.967 AU)
- Apr 29 - Comet 48P/Johnson Closest Approach To Earth (2.686 AU)
- Apr 29 - Comet 204P/LINEAR-NEAT Closest Approach To Earth (2.917 AU)
- Apr 29 - Comet C/2015 WZ (PANSTARRS) At Opposition (3.728 AU)
- Apr 29 - Apollo Asteroid 2017 FE157 Near-Earth Flyby (0.047 AU)
- Apr 29 - Asteroid 30785 Greeley Closest Approach To Earth (1.280 AU)
- Apr 29 - Asteroid 30928 Jefferson Closest Approach To Earth (1.808 AU)
- Apr 29 - Asteroid 5249 Giza Closest Approach To Earth (1.792 AU)
- Apr 29 - Kuiper Belt Object 2014 FC69 At Opposition (83.543 AU)
- Apr 29 - Forest Moulton's 145th Birthday (1872)
- Apr 30 - 

[Apr 26] NROL-76 Falcon 9 Launch
- Apr 30 - Comet 73P-AR/Schwassmann-Wachmann Perihelion (0.968 AU)
- Apr 30 - Comet C/2015 B1 (PANSTARRS) Closest Approach To Earth (5.503 AU)
- Apr 30 - 

[Apr 27] Apollo Asteroid 2017 HU3 Near-Earth Flyby (0.016 AU)
- Apr 30 - Asteroid 4319 Jackierobinson Closest Approach To Earth (1.271 AU)
- Apr 30 - Asteroid 11277 Ballard Closest Approach To Earth (1.373 AU)
- Apr 30 - Asteroid 5062 Glennmiller Closest Approach To Earth (1.630 AU)
- Apr 30 - Asteroid 3665 Fitzgerald Closest Approach To Earth (1.678 AU)
- Apr 30 - Asteroid 5811 Keck Closest Approach To Earth (1.702 AU)
- Apr 30 - Kuiper Belt Object 2010 EK139 At Opposition (35.761 AU)
- Apr 30 - 50th Anniversary (1967), 1st Image of Earth Taken from Moon's Surface (Surveyor 3)
- Apr 30 - 120th Anniversary (1897), Joseph John Thomson's Discovery of the Electron
- Apr 30 - Carl Friedrich Gauss' 240th Birthday (1777)
- May 01 - Comet 73P-AQ/Schwassmann-Wachmann Perihelion (0.967 AU)
- May 01 - Aten Asteroid 326290 Akhenaten Closest Approach To Earth (0.298 AU)
- May 01 - Asteroid 16770 Angkorwat Closest Approach To Earth (1.734 AU)
- May 01 - Asteroid 2404 Antarctica Closest Approach To Earth (1.778 AU)
- May 01 - Lecture: Cassini's Grand Finale, Ithaca, New York
- May 01 - 335th Anniversary (1682), Inauguration of the Paris Observatory
- May 01 - Johann Adam Schall von Bell's 425th Birthday (1592)

Source: JPL Space Calendar

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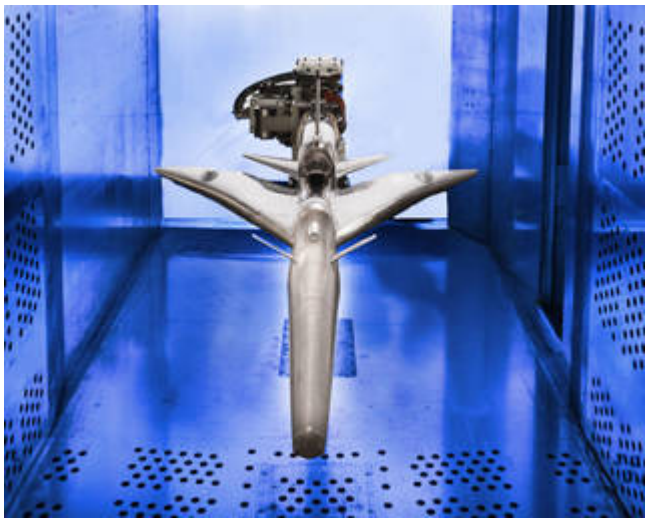
Food for Thought

The QueSST for Quiet



Can you imagine flying from New York to Los Angeles in half the time?

Think about it. Commercial flight over land in a supersonic jet would mean less time in-flight; less time in a cramped seat next to your new, and probably unwanted, best friend; fewer tiny bags of peanuts; and more time at your destination.

Couldn't Concorde do that? Nope. Concorde, which last flew in 2003, utilized 1950s technology, was only supersonic over the ocean and was deemed too noisy to fly over people. It also burned a lot of fuel and was an expensive ticket. Approximately $15,000 for a round-trip seat in today's dollars! That makes our wallets hurt.

Ok, so just build a new Concorde with new technology that saves fuel. Well, it's really not that easy. Since 1973, supersonic flight over land has been forbidden in the United States because of the noise from sonic boom. A new supersonic commercial airplane needs to beat the boom problem and be efficient as well.

That's what NASA's Commercial Supersonic Technology Project is trying to do. After years of work, we think we can bring something new to the table that produces acceptable in-flight noise to communities along flight paths. We are ready to prove it, and that is where the Quiet Supersonic Technology (QueSST) experimental aircraft (X-plane) concept being developed by NASA and partner Lockheed Martin comes in.

Here's the lowdown on the project:

- Although the overall goal is improved quality of life for those on the ground and those in the air, the big step in the near term is to show we can beat the boom. To accomplish this, a unique X-plane, one that uses distinctive shaping – a long nose, highly swept wings, etc. – is being designed. This piloted X-plane will look to prove that sonic booms can be turned into sonic thumps, and eventually help make the case for updating the rule against supersonic flight over land.

- *What's QueSST?* QueSST is a preliminary design concept of that unique X-plane. It's not an airliner. The design relies mostly on computer models to ensure all the pieces will come together for a future real airplane.

- To verify the aerodynamic performance predictions of the fuselage shape, control surfaces and engine inlet the NASA-Lockheed team has built a scale model of the QueSST design for wind-tunnel testing. NASA Glenn Research Center's 8' X 6' wind tunnel was selected for this testing because of its size and unique capability to test at a large range of speeds.

- *So, what's next?* NASA will review the test data and complete the preliminary design review. If data is positive and approval is obtained, then a contract for the design, fabrication and testing of a single-seat flight demonstration X-plane could be awarded. Flight testing could begin as early as 2021.

Source: NASA

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Space Image of the Week

Mt. Etna Lava Plume

Explanation: Mt. Etna has been erupting for hundreds of thousands of years. Located in Sicily, Italy, the volcano produces lava fountains over one kilometer high. Mt. Etna is not only one of the most active volcanoes on Earth, it is one of the largest, measuring over 50 kilometers at its base and rising nearly 3 kilometers high. Pictured in mid-March, a spectacular lava plume erupts upwards, dangerous molten volcanic bombs fly off to the sides, while hot lava flows down the volcano's exterior. The Earth's rotation is discernable on this carefully time, moon-lit, long duration image as star trails.

Image Credit & Copyright: Dario Giannobile

Source: Astronomy Picture of the Day

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