

Space News Update

– August 30, 2019 –

Contents

In the News

[Story 1:](#)

Hints of a Volcanically Active Exomoon

[Story 2:](#)

Exoplanets Can't Hide Their Secrets from Innovative New Instrument

[Story 3:](#)

Kennedy Space Center Braces for Hurricane Dorian

Departments

[The Night Sky](#)

[ISS Sighting Opportunities](#)

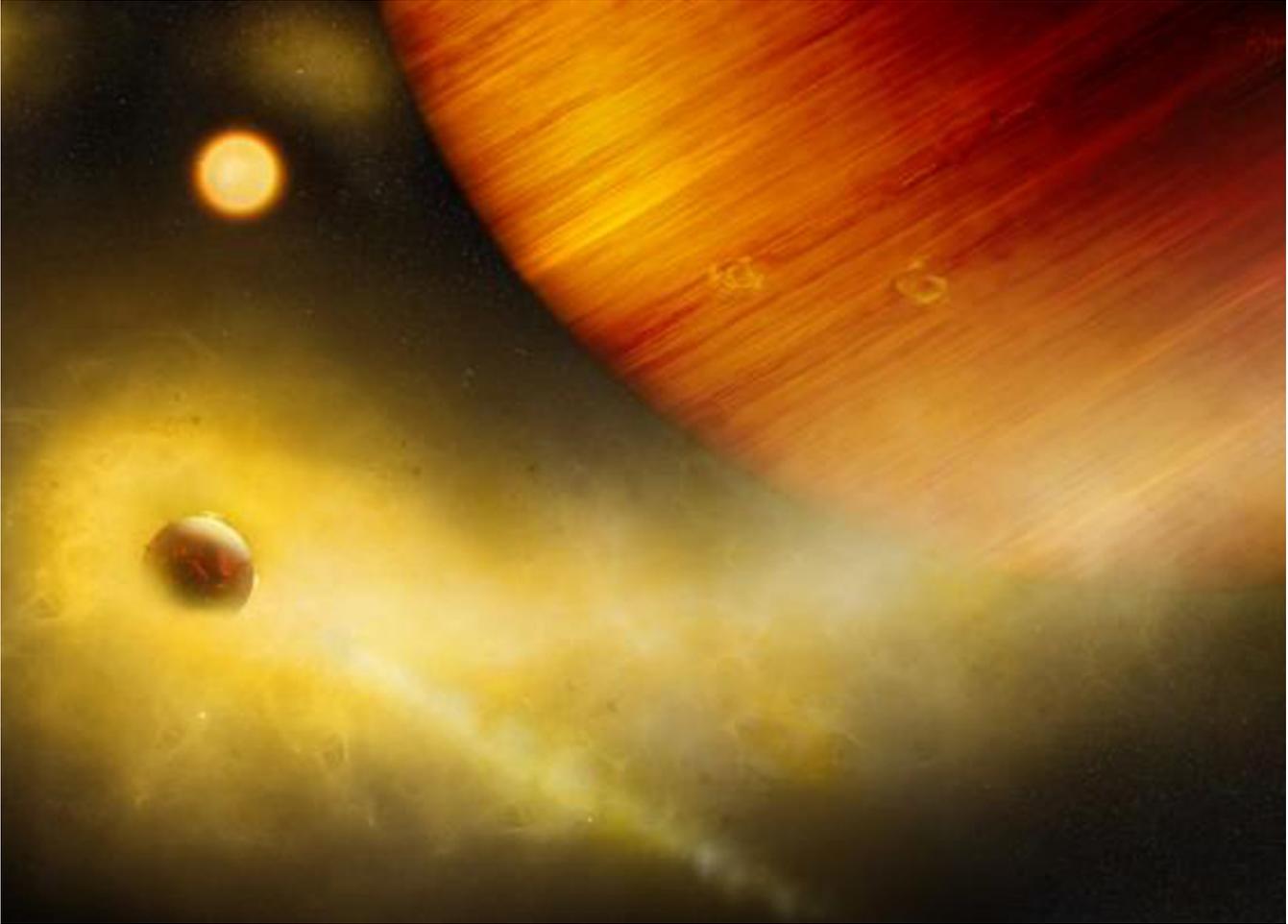
[Space Calendar](#)

[NASA-TV Highlights](#)

[Food for Thought](#)

[Space Image of the Week](#)

1. Hints of a Volcanically Active Exomoon



Jupiter's moon Io is the most volcanically active body in our solar system. Today, there are indications that an active moon outside our solar system, an exo-Io, could be hidden at the exoplanet system WASP-49b.

"It would be a dangerous volcanic world with a molten surface of lava, a lunar version of close-in Super Earths like 55 Cancri-e" says Apurva Oza, postdoctoral fellow at the Physics Institute of the University of Bern and associate of the NCCR PlanetS, "a place where Jedi go to die, perilously familiar to Anakin Skywalker." But the object that Oza and his colleagues describe in their work seems to be even more exotic than Star Wars science fiction: the possible exomoon would orbit a hot giant planet, which in turn would race once around its host star in less than three days - a scenario 550 light years away in the inconspicuous constellation of Lepus, underneath the bright Orion constellation.

Sodium gas as circumstantial evidence

Astronomers have not yet discovered a rocky moon beyond our solar system and it's on the basis of circumstantial evidence that the researchers in Bern conclude that the exo-Io exists: Sodium gas was detected at the WASP 49-b at an anomalously high-altitude. "The neutral sodium gas is so far away from the planet that it is unlikely to be emitted solely by a planetary wind," says Oza. Observations of Jupiter and Io in our solar system, by the international team, along with mass loss calculations show that an exo-Io could be a very plausible source of sodium at WASP 49-b. "The sodium is right where it should be" says the astrophysicist.

Tides keep the system stable

Already in 2006, Bob Johnson of the University of Virginia and the late Patrick Huggins at New York University, USA had shown that large amounts of sodium at an exoplanet could point to a hidden moon or ring of material, and ten years ago, researchers at Virginia calculated that such a compact system of three bodies: star, close-in giant planet and moon, can be stable over billions of years. Apurva Oza was then a student at Virginia, and after his PhD on moons atmospheres in Paris, decided to pick up the theoretical calculations of these researchers. He now publishes the results of his work together with Johnson and colleagues in the *Astrophysical Journal*.

"The enormous tidal forces in such a system are the key to everything," explains the astrophysicist. The energy released by the tides to the planet and its moon keeps the moon's orbit stable, simultaneously heating it up and making it volcanically active. In their work, the researchers were able to show that a small rocky moon can eject more sodium and potassium into space through this extreme volcanism than a large gas planet, especially at high altitudes. "Sodium and potassium lines are quantum treasures to us astronomers because they are extremely bright," says Oza, "the vintage street lamps that light up our streets with yellow haze, is akin to the gas we are now detecting in the spectra of a dozen exoplanets."

"We need to find more clues"

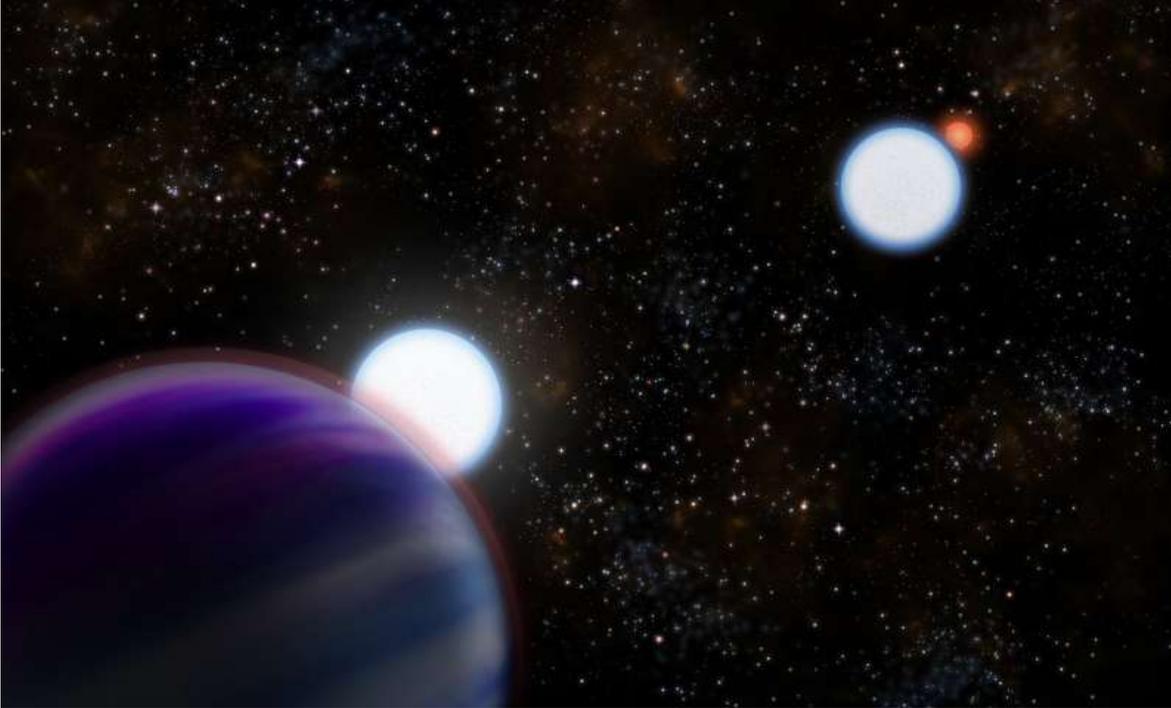
The researchers compared their calculations with these observations and found five candidate systems where a hidden exomoon can survive against destructive thermal evaporation. For WASP 49-b the observed data can be best explained by the existence of an exo-Io. However, there are other options. For example, the exoplanet could be surrounded by a ring of ionized gas, or non-thermal processes. "We need to find more clues," Oza admits. The researchers are therefore relying on further observations with ground-based and space-based instruments.

"While the current wave of research is going towards habitability and biosignatures, our signature is a signature of destruction", says the astrophysicist. A few of these worlds could be destroyed in a few billion years due to the extreme mass loss. "The exciting part is that we can monitor these destructive processes in real time, like fireworks", says Oza.

Source: Spaceref.com

[Return to Contents](#)

2. Exoplanets Can't Hide Their Secrets from Innovative New Instrument



In an unprecedented feat, an American research team discovered hidden secrets of an elusive exoplanet using a powerful new instrument at the 8-meter Gemini North telescope on Maunakea in Hawai'i. The findings not only classify a Jupiter-sized exoplanet in a close binary star system, but also conclusively demonstrate, for the first time, which star the planet orbits.

The breakthrough occurred when Steve B. Howell of the NASA Ames Research Center and his team used a high-resolution imaging instrument of their design—named 'Alopeke (a contemporary Hawaiian word for Fox). The team observed exoplanet Kepler-13b as it passed in front of (transited) one of the stars in the Kepler-13AB [binary star system](#) some 2,000 light years distant. Prior to this attempt, the true nature of the exoplanet was a mystery.

"There was confusion over Kepler-13b: was it a [low-mass star](#) or a hot Jupiter-like world? So we devised an experiment using the sly instrument 'Alopeke," Howell said. The research was recently published in the *Astronomical Journal*. "We monitored both stars, Kepler A and Kepler B, simultaneously while looking for any changes in brightness during the planet's transit," Howell explained. "To our pleasure, we not only solved the mystery, but also opened a window into a new era of exoplanet research."

"This dual win has elevated the importance of instruments like 'Alopeke in exoplanet research," said Chris Davis of the National Science Foundation, one of Gemini's sponsoring agencies. "The exquisite seeing and telescope abilities of Gemini Observatory, as well as the innovative 'Alopeke instrument made this discovery possible in merely four hours of observations."

'Alopeke performs "speckle imaging," collecting a thousand 60-millisecond exposures every minute. After processing this large amount of data, the final images are free of the adverse effects of atmospheric turbulence—which can bloat, blur, and distort star images.

"About one half of all exoplanets orbit a star residing in a binary system, yet, until now, we were at a loss to robustly determine which star hosts the planet," said Howell.

The team's analysis revealed a clear dip in the light from Kepler A, proving that the planet orbits the brighter of the two stars. Moreover, 'Alopeke simultaneously provides data at both red and blue wavelengths, an unusual capability for speckle imagers. Comparing the red and blue data, the researchers were surprised to discover that the dip in the star's blue light was about twice as deep as the dip seen in red light. This can be explained by a hot exoplanet with a very extended atmosphere, which more effectively blocks the light at blue wavelengths. Thus, these multi-color speckle observations give a tantalizing glimpse into the appearance of this distant world.

Early observations once pointed to the transiting object being either a low-mass star or a brown dwarf (an object somewhere between the heaviest planets and the lightest stars). But Howell and his team's research almost certainly shows the object to be a Jupiter-like gas-giant exoplanet with a "puffed up" atmosphere due to exposure to the tremendous radiation from its host star.

'Alopeke has an identical twin at the Gemini South telescope in Chile, named Zorro, which is the word for fox in Spanish. Like 'Alopeke, Zorro is capable of speckle imaging in both blue and red wavelengths. The presence of these instruments in both hemispheres allows Gemini Observatory to resolve the thousands of exoplanets known to be in multiple star systems.

"Speckle imaging is experiencing a renaissance with technology like fast, low noise detectors becoming more easily available," said team member and 'Alopeke instrument scientist Andrew Stephens at the Gemini North telescope. "Combined with Gemini's large primary mirror, 'Alopeke has real potential to make even more significant exoplanet discoveries by adding another dimension to the search."

First proposed by French astronomer Antoine Labeyrie in 1970, speckle imaging is based on the idea that atmospheric turbulence can be "frozen" when obtaining very short exposures. In these short exposures, stars look like collections of little spots, or speckles, where each of these speckles has the size of the telescope's optimal limit of resolution. When taking many exposures, and using a clever mathematical approach, these speckles can be reconstructed to form the true image of the source, removing the effect of atmospheric turbulence. The result is the highest-quality image that a telescope can produce, effectively obtaining space-based resolution from the ground—making these instruments superb probes of extrasolar environments that may harbor planets.

The discovery of planets orbiting other stars has changed the view of our place in the Universe. Space missions like NASA's Kepler/K2 Space Telescope and the Transiting Exoplanet Survey Satellite (TESS) have revealed that there are twice as many planets orbiting stars in the sky than there are stars visible to the unaided eyes; to date the total discovery count hovers around 4,000. While these telescopes detect exoplanets by looking for tiny dips in the brightness of a star when a planet crosses in front of it, they have their limits.

"These missions observe large fields of view containing hundreds of thousands of stars, so they don't have the fine spatial resolution necessary to probe deeper," Howell said. "One of the major discoveries of exoplanet research is that about one-half of all exoplanets orbit stars that reside in binary systems. Making sense of these complex systems requires technologies that can conduct time sensitive observations and investigate the finer details with exceptional clarity."

"Our work with Kepler-13b stands as a model for future research of exoplanets in multiple star systems," Howell continued. "The observations highlight the ability of high-resolution imaging with powerful telescopes like Gemini to not only assess which stars with planets are in binaries, but also robustly determine which of the [stars](#) the [exoplanet](#) orbits."

Explore further: [Half of all exoplanet host stars are binaries](#)

Source: [Phys.org](#)

[Return to Contents](#)

3. Kennedy Space Center Braces for Hurricane Dorian



NASA civil servants and the agency's contractor work force are bracing for high winds and rain from Hurricane Dorian, securing rocket stages, spacecraft assembly areas and even hauling a 6.7-million-pound mobile launch tower, designed for the huge rocket being built for the Artemis moon program, back to the cavernous Vehicle Assembly Building for safekeeping.

The 355-foot-tall gantry structure, carried atop a squat Apollo-era crawler-transporter, is scheduled to begin the 4.2-mile trip from launch complex 39B back to the protection of the VAB at dawn Friday, a journey expected to take more than eight hours to complete.

The VAB was designed to withstand winds of 125 miles per hour without major damage. The highest wind ever recorded at NASA's seaside launch pads during an earlier hurricane was around 115 mph.

"Right not, we're looking at a Cat-4 hurricane, which is nothing to sneeze at," Bob Cabana, director of the Kennedy Space Center and a former shuttle commander, told CBS News. "It's predicted to come in a little south of us, which actually puts us on the wet side of the storm, the storm surge, which is a concern."

In the wake of Hurricane Sandy in 2012, beach dunes protecting launch pads 39A and 39B suffered major damage and erosion. A beach restoration project was carried out and more sand was pumped ashore after two more recent hurricanes, Irma and Matthew.

"Unfortunately, all the growth that's required to stabilize the dunes hasn't had a chance to really take hold," Cabana said. "So we'll see how that performs in light of the storm surge that's coming. I'm hoping there's enough growing out there that it stays in place. Again, that's to protect the pads."

As for the mobile launcher perched atop pad 39B, "obviously, it's a huge investment," Cabana said of the towering structure. With Dorian approaching Florida's Space Coast, NASA managers met Wednesday and decided to protectively move the crawler-transporter to the pad. The mobile launcher was designed to

withstand a category 1 hurricane but given Dorian's steady strengthening, the decision was made Thursday to haul it back to the VAB.

The space center will go to hurricane condition 3, or Hurcon 3, status on Friday. Normally, that is done when 50-knot winds are expected within 48 hours, but Cabana said he was putting it into place earlier than usual "because it's a holiday weekend, we wanted to get ready early and make sure folks have a chance to get off Saturday and Sunday and take care of preparations for themselves."

Based on the storm's track and when high winds are expected, NASA plans to close the Kennedy Space Center Sunday. A "rideout" team of 100 to 120 space center workers will remain behind in the Emergency Operations Center located next to the VAB, inside the Launch Control Center. The building is designed to withstand a category 5 hurricane.

"Once the storm passes, we'll bring the damage assessment and recovery team in to make sure the center is safe for bringing folks back on board," Cabana said. "Depending on how things go, we could bring them in as early as Tuesday. It just depends on when the storm passes and what the winds are and when it's safe."

Space Launch System rockets, being built by Boeing in a sprawling plant just outside New Orleans, will launch Orion crew capsules to the moon. An unpiloted test flight is planned for 2021, followed by a crewed around-the-moon test flight in the 2022-23 timeframe and a moon landing mission in 2024.

The Lockheed Martin-built Orion capsule that will be launched atop the first SLS booster in 2021 is being assembled in a hangar-like processing building at the heart of the Kennedy Space Center where Apollo moon ships were once tested for flight. Sandbags are being positioned around door frames and loose material outside the building is being hauled indoors.

A spokeswoman for United Launch Alliance, a partnership between Boeing and Lockheed Martin that builds Delta 4 and Atlas 5 rockets, said the company is making sure its vehicles are protected in processing facilities at the Cape Canaveral Air Force Station. Atlas stages needed to launch Boeing's first two CST-100 Starliner commercial crew ships are at the Cape, as are components for a Delta 4 "Heavy" scheduled for launch next year.

"All ULA facilities are designed to withstand hurricane-force winds," the spokeswoman told Spaceflight Now. "Those design loads vary relative to the facility and the timeframe in which it was designed. The majority of our launch facilities have been designed for wind speeds of 130 mph and higher. ... Our design processes include additional factors on top of those wind loads, such that we would expect our systems to be likely capable of withstanding higher winds without suffering major damage."

SpaceX currently launches Falcon 9 rockets from pad 40 at the Cape Canaveral Air Force Station and Falcon 9s and Falcon Heavy boosters from pad 39A at the nearby Kennedy Space Center. A spokesman said the company was working with Air Force and NASA personnel "to take all necessary precautions to protect our employees and safeguard facilities in the potentially affected areas."

Cabana said he was hopeful Dorian would not cause "a major impact to the community and our folks."

"That's the biggest concern," he said. "Hardware, that's replaceable. But my concern is the team here at KSC, I want to make sure everybody gets home, takes care of their families and we get everybody back here safely to keep pressing on to get Artemis to the moon by 2024."

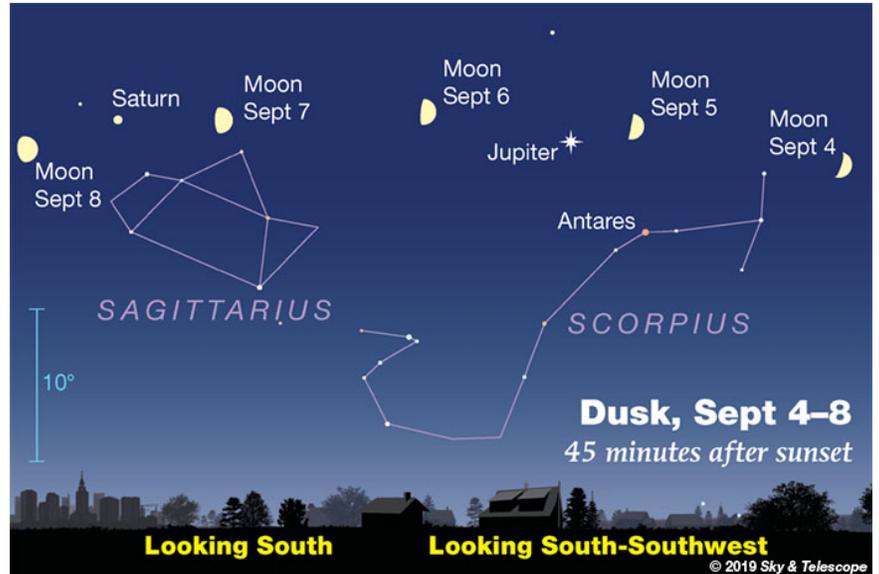
Source: [Spaceflight Now](#)

[Return to Contents](#)

The Night Sky

Friday, Aug. 30

- The Milky Way extends upward from the low south-southwest just after dark. Before the Moon becomes bright later this week, this is your last good chance this year to finally get straight which clumps are the Large Sagittarius Star Cloud (with M8 above it), the Small Sagittarius Star Cloud (a.k.a. M24), the lesser-known Gamma Scuti Star Cloud, and the Scutum Star Cloud on top. In a dark sky they stand out almost ladder-like. See the labeled photo with Fred Schaaf's "Musings on Eternity" in the September [Sky & Telescope](#), page 45.



- New Moon (exact at 6:37 a.m. on this date EDT.)

Saturday, Aug. 31

- Altair is the brightest star on the southern side of the sky after dark. (We're not counting the planets Jupiter and Saturn, far to its lower right.) Spot Altair's little orange companion Tarazed to its upper right by just a finger width at arm's length.

Look to Altair's upper left, by a bit more than a fist, for little Delphinus, the Dolphin.

Closer above Altair is even smaller, fainter Sagitta, the Arrow.

Sunday, Sept. 1

- By 9 or 10 p.m. two of the most famous deep-sky objects, the Double Cluster in Perseus and the Great Andromeda Galaxy M31, are in high view in the east. Did you know they're only 22° apart? They're both cataloged as 4th magnitude but to the naked eye they look rather different, the more so the darker your sky. See for yourself; they're plotted on the all-sky constellation map in the center of the September [Sky & Telescope](#), which should be all the map you need to identify their locations. Sky too bright? Use binoculars!

The two clusters of the Double Cluster (NGC 869 and NGC 884) are at very similar distances about 7,600 light-years away. M31, at 2.5 million light-years, is about 330 times farther out.

Monday, Sept. 2

- Whenever bright Vega crosses nearest your zenith, as it does at nightfall now, you know that the Sagittarius Teapot must be at its highest due south even if it's hidden by buildings or trees (or twilight). The Teapot is currently under Saturn.

Two hours later when Deneb crosses closest to the zenith, it's the turn of Delphinus and boat-shaped Capricornus down below to stand at their highest in the south.

Source: [Sky & Telescope](#)

[Return to Contents](#)

ISS Sighting Opportunities

[For Denver:](#)

Date	Visible	Max Height	Appears	Disappears
Sat Aug 31, 4:33 AM	1 min	55°	55° above N	24° above NE
Sun Sep 1, 3:46 AM	< 1 min	16°	16° above ENE	16° above ENE
Sun Sep 1, 5:19 AM	4 min	19°	13° above WNW	11° above NNE
Mon Sep 2, 4:32 AM	2 min	26°	26° above NNW	13° above NNE
Tue Sep 3, 3:46 AM	< 1 min	14°	14° above NE	14° above NE
Tue Sep 3, 5:19 AM	3 min	13°	10° above NW	10° above NNE

Sighting information for other cities can be found at NASA's [Satellite Sighting Information](#)

NASA-TV Highlights (all times Eastern Daylight Time)

No Special Programming

Watch NASA TV on the Net by going to the [NASA website](#).

[Return to Contents](#)

Space Calendar

- Aug 30 - [Comet 26P/Grigg-Skjellerup Closest Approach To Earth](#) (2.402 AU)
- Aug 30 - **NEW** [Aug 30] [Apollo Asteroid 2019 QU4](#) Near-Earth Flyby (0.012 AU)
- Aug 30 - **NEW** [Aug 29] [Apollo Asteroid 2019 QR3](#) Near-Earth Flyby (0.015 AU)
- Aug 30 - [Asteroid 1501 Baade](#) Closest Approach To Earth (1.162 AU)
- Aug 30 - [Asteroid 75564 Audubon](#) Closest Approach To Earth (1.616 AU)
- Aug 30 - [Asteroid 3131 Mason-Dixon](#) Closest Approach To Earth (2.018 AU)
- Aug 30 - [Asteroid 8373 Stephengould](#) Closest Approach To Earth (4.177 AU)
- Aug 31 - **UPDATED** [Aug 30] KX-09 Kuaizhou 1A Launch
- Aug 31 - [Comet C/2018 R5 \(Lemmon\) At Opposition](#) (3.360 AU)
- Aug 31 - **NEW** [Aug 30] [Apollo Asteroid 2019 QD4](#) Near-Earth Flyby (0.015 AU)
- Aug 31 - **NEW** [Aug 26] [Apollo Asteroid 2019 QP1](#) Near-Earth Flyby (0.027 AU)
- Aug 31 - [Asteroid 130 Elektra](#) (2 Moons) Closest Approach To Earth (1.615 AU)
- Sep 01 - [Parker Solar Probe](#), 3rd Perihelion
- Sep 01 - [Comet 322P/SOHO](#) Perihelion (0.062 AU)
- Sep 01 - [Apollo Asteroid 1620 Geographos Closest Approach To Earth](#) (0.137 AU)
- Sep 01 - [Asteroid 3623 Chaplin](#) Closest Approach To Earth (1.614 AU)
- Sep 01 - [Kuiper Belt Object 408706 \(2004 NT33\) At Opposition](#) (38.417 AU)
- Sep 01 - 40th Anniversary (1979), [Pioneer 11](#), Saturn Flyby
- Sep 01 - 160th Anniversary (1859), [Solar Storm of 1859](#)
- Sep 02 - [Comet P/2012 O2 \(McNaught\) Closest Approach To Earth](#) (1.250 AU)
- Sep 02 - [Comet C/2019 LB7 \(Kleyana\) At Opposition](#) (1.974 AU)
- Sep 02 - [Comet C/2017 M5 \(TOTAS\) Closest Approach To Earth](#) (5.815 AU)
- Sep 02 - **NEW** [Aug 27] [Apollo Asteroid 2019 QX1](#) Near-Earth Flyby (0.048 AU)
- Sep 02 - [Asteroid 4122 Ferrari](#) Closest Approach To Earth (1.668 AU)
- Sep 02 - [Asteroid 243 Ida](#) Closest Approach To Earth (1.867 AU)
- Sep 02 - [Asteroid 1541 Estonia](#) Closest Approach To Earth (1.919 AU)
- Sep 02 - [Asteroid 499 Venusia](#) Closest Approach To Earth (2.916 AU)
- Sep 02 - [Kuiper Belt Object 2003 QX113 At Opposition](#) (59.246 AU)
- Sep 02 - [Guy Laliberte's 60th Birthday](#) (1959)
- Sep 02 - 215th Anniversary (1804), [Karl Harding's](#) Discovery of [Asteroid 3 Juno](#)



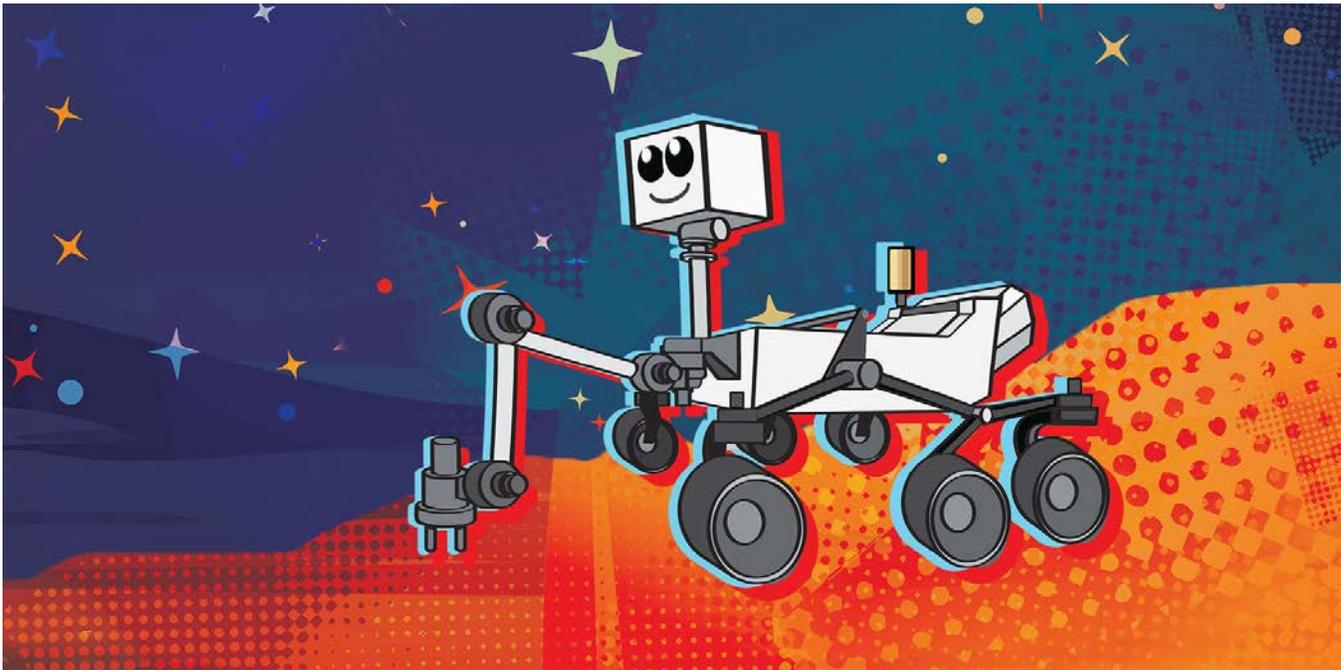
Karl Ludwig Harding

Source: [JPL Space Calendar](#)

[Return to Contents](#)

Food for Thought

NASA Invites Students to Name Next Mars Rover



Starting Tuesday, K-12 students in U.S. public, private and home schools can enter the Mars 2020 Name the Rover essay contest. One grand prize winner will name the rover and be invited to see the spacecraft launch in July 2020 from Cape Canaveral Air Force Station in Florida.

The Name the Rover contest is part of NASA's efforts to engage students in the STEM enterprise behind Mars exploration and inspire interest in science, technology, engineering and mathematics.

"This naming contest is a wonderful opportunity for our nation's youth to get involved with NASA's Moon to Mars missions," said NASA Administrator Jim Bridenstine. "It is an exciting way to engage with a rover that will likely serve as the first leg of a Mars Sample return campaign, collecting and caching core samples from the Martian surface for scientists here on Earth to study for the first time."

The Mars 2020 rover is a 2,300-pound robotic scientist that will search for signs of past microbial life, characterize the planet's climate and geology, collect samples for future return to Earth, and pave the way for human exploration of the Red Planet.

"Our Mars 2020 rover has fully taken shape over the past several months, as the project team installed various components onto the chassis: the computer brain and electronics; wheels and mobility system; robotic arm; remote sensing mast; the seven science instruments; and finally, the sample caching system," said George Tahu, Mars 2020 program executive. "All that's missing is a great name!"

To enter the contest, students must submit by Nov. 1 their proposed rover name and a short essay, no more than 150 words, explaining why their proposed name should be chosen. The essays will be divided into three groups, by grade level – K-4, 5-8, and 9-12 – and judged on the appropriateness, significance and originality of their proposed name, and the originality and quality of their essay, and/or finalist interview presentation.

Fifty-two semifinalists will be selected per group, each representing their respective state or U.S. territory. Three finalists then will be selected from each group to advance to the final round.

As part of the final selection process, the public will have an opportunity to vote online on the nine finalists in January 2020. NASA plans to announce the selected name on Feb. 18, 2020 – exactly one year before the rover will land on the surface of Mars.

For complete contest and prize details, visit <https://mars.nasa.gov/mars2020/participate/name-the-rover/>.

The naming contest partnership is part of a Space Act Agreement between NASA, Battelle of Columbus, Ohio, and Future Engineers of Burbank, California, in educational and public outreach efforts.

Register to be a Judge

NASA is seeking volunteers to help judge the thousands of contest entries anticipated to pour in from around the country. U.S. residents over 18 years old who are interested in offering approximately five hours of their time to review submissions should register to be a judge at:

<https://www.futureengineers.org/registration/judge/nametherover>.

Rover Update

With all major elements onboard and initial functional checks complete, Mars 2020's Assembly, Test, and Launch Operations team is preparing the rover and its sky crane descent stage for the next big test: simulating the vibration dynamics of launch and the thermal environment the rover will experience on the surface of Mars.

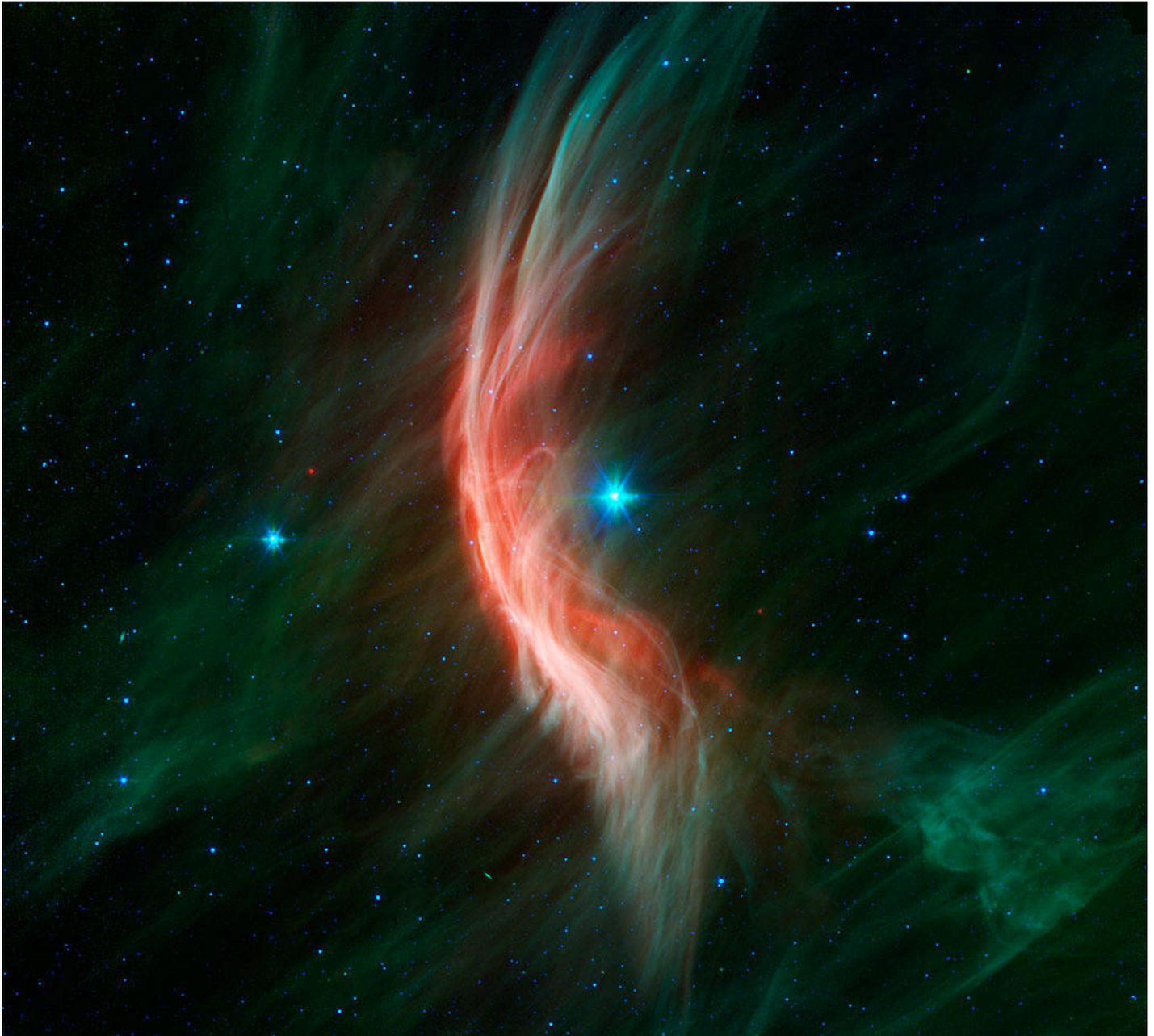
NASA's Jet Propulsion Laboratory in Pasadena, California, manages rover development for the agency. The Launch Services Program at NASA's Kennedy Space Center in Florida is responsible for launch management.

For more about NASA's Moon to Mars plans, visit <https://www.nasa.gov/topics/moon-to-mars>.

Source: [NASA](#)

[Return to Contents](#)

Space Image of the Week



Celebrating Spitzer's Sweet Sixteen

Explanation [Sixteen years ago](#), NASA launched its [Spitzer Space Telescope](#) into orbit around the Sun. Since the observatory launched on Aug. 25, 2003, it has been lifting the veil on the wonders of the cosmos, from our own solar system to faraway galaxies, using infrared light. Spitzer's primary mission lasted five-and-a-half years and ended when it ran out of the liquid helium coolant necessary to operate two of its three instruments. But its passive-cooling design has allowed part of its third instrument to continue operating for more than 10 additional years. The mission is scheduled to [end on Jan. 30, 2020](#).

This Spitzer image shows the giant star Zeta Ophiuchi and the bow shock, or shock wave, in front of it. Visible only in infrared light, the bow shock is created by winds that flow from the star, making ripples in the surrounding dust. Located roughly 370 light-years from Earth, Zeta Ophiuchi dwarfs our Sun: It is about six

times hotter, eight times wider, 20 times more massive and about 80,000 times as bright. Even at its great distance, it would be one of the brightest stars in the sky were it not largely obscured by dust clouds.

Read more about this image here: <https://www.jpl.nasa.gov/news/news.php?feature=3630>

Image Credit: NASA/JPL-Caltech

Source: [NASA Image of the Day](#)

[Return to Contents](#)