

# Space News Update

– November 14, 2017 –

## Contents

### In the News

#### Story 1:

Sierra Nevada's Dream Chaser performs critical glide test flight

#### Story 2:

Building Electronics That Can Work on Venus

#### Story 3:

Duo of titanic galaxies captured in extreme starbursting merger

### Departments

#### The Night Sky

#### ISS Sighting Opportunities

#### Space Calendar

#### NASA-TV Highlights

#### Food for Thought

#### Space Image of the Week

## 1. Sierra Nevada's Dream Chaser performs critical glide test flight



An atmospheric test article of Sierra Nevada Corp.'s Dream Chaser spaceship made a successful runway landing Saturday at Edwards Air Force Base in California after a glide test flight performed to verify the craft's handling qualities and guidance systems before future resupply missions to the International Space Station.

The unpiloted spacecraft was dropped from a helicopter and landed on Runway 22L at Edwards, the same landing strip that returning space shuttles once used.

Sierra Nevada celebrated the accomplishment on Twitter, releasing four photos of the Dream Chaser's flight test, which was expected and long planned, but not publicly announced in advance. More information and imagery of the landing will be released Monday, the company said.

Roughly one-quarter the length of a space shuttle orbiter, the Dream Chaser was to be released from a heavy-duty carrier helicopter at an altitude of around 10,000 feet (3,000 meters) for the approach and landing test, Sierra Nevada officials previously said.

The spacecraft was carried aloft under the helicopter connected with a 200-foot (60-meter) lift line, then positioned for the drop. The Dream Chaser's on-board guidance computer was expected to maneuver the ship with its aerosurfaces, then line up with the runway for a steep final approach.

Two main landing gear wheels and a nose skid deployed from the bottom of the spaceplane just before touchdown.

Sierra Nevada is developing the Dream Chaser in partnership with NASA to carry cargo and experiments to the space station. It will launch on top of a rocket and land on a runway, returning equipment and experiment specimens to the ground for quick handover to engineers and scientists.

Based on NASA's HL-20 lifting body design and originally proposed to ferry astronauts, the Dream Chaser has morphed into an automated supply ship. The Dream Chaser was a finalist for NASA's commercial crew program alongside capsule designs developed by Boeing and SpaceX, receiving more than \$360 million in government funding guarantees to support design and testing efforts.

But NASA selected Boeing and SpaceX to complete their crew capsules after a competition in 2014, leaving Sierra Nevada's Dream Chaser with an uncertain future. But Sierra Nevada engineers redesigned the

spaceplane for cargo missions and won a lucrative NASA contract in January 2016 for at least six round-trip flights to and from the space station.

The first orbital flight of the Dream Chaser is scheduled around 2020, lifting off aboard a United Launch Alliance Atlas 5 rocket from Cape Canaveral, and likely returning to touch down at the Shuttle Landing Facility runway at NASA's Kennedy Space Center in Florida.

Sierra Nevada is contributing its own funding to the Dream Chaser program and is in charge of development testing. The financial terms of NASA's resupply contract have not been disclosed, but the deal's value is believed to be more than \$1 billion.

The successful touchdown Saturday came more than four years after the same Dream Chaser test vehicle crash-landed on its first approach and landing demonstration. The ship's left main landing gear did not extend before it reached the runway, and the Dream Chaser lost control and skidded to a stop.

Sierra Nevada said the 2013 flight was successful until that point, and Dream Chaser's autopilot landing system steered the craft toward the runway for a touchdown on the centerline.

Engineers blamed the mishap on a landing gear borrowed from a U.S. Air Force F-5E jet. Future Dream Chaser cargo missions to the space station will fly with a different landing gear, and the refurbished spaceship that flew Saturday carried a landing gear more advanced than the one at fault in 2013.

Engineers also upgraded the ship's computer systems to be more like the orbital version of the Dream Chaser.

Ground teams transported the damaged vehicle back to Sierra Nevada's space division headquarters in Louisville, Colorado, for repairs and upgrades. The craft returned to the Mojave Desert test site in California in January for a series of tow tests and captive carry aerial flights under a helicopter to check its braking and steering capabilities, radio telemetry links, and guidance and navigation equipment before officials committed to a free flight.

Sierra Nevada is set to receive a multimillion-dollar award payment from NASA after the successful approach and landing test.

Company officials said the test vehicle that flew Saturday featured space-rated avionics and flight software that will be used on Dream Chaser missions to the space station. Lockheed Martin has partnered with Sierra Nevada to produce the composite structural shell for orbital-class Dream Chaser vehicles.

The Dream Chaser is capable of delivering more than 12,000 pounds (5,500 kilograms) of equipment to the space station inside its pressurized compartment and on an external aft-mounted payload carrier. At the end of each flight, the two parts will detach, with the Dream Chaser space plane returning to Earth with research specimens and other gear, and the disposable cargo module burning up in the atmosphere to incinerate trash.

Based on a lifting body aerodynamic design, the Dream Chaser will weigh about 20 tons fully loaded, likely requiring the lift capability of ULA's most powerful Atlas 5 configuration, the "552" with five strap-on solid rocket boosters and a twin-engine Centaur upper stage, according to Sierra Nevada officials.

Sierra Nevada also has agreements with the European Space Agency to study the use of Dream Chaser to provide access to space for European research experiments after the end of the space station program in the 2020s. The United Nations agreed last year to purchase a standalone unpiloted Dream Chaser mission to Earth orbit in 2021 to host research payloads from developing nations.

## 2. Building Electronics That Can Work on Venus



The [weather on Venus](#) is like something out of Dante's *Inferno*. The average surface temperature – 737 K (462 °C; 864 °F) – is hot enough to melt lead and the atmospheric pressure is 92 times that of Earth's at sea level (9.2 MPa). For this reason, very few robotic missions have ever made it to the [surface of Venus](#), and those that have did not last long – ranging from about 20 minutes to just over two hours.

Hence why NASA, with an eye to future missions, is looking to create robotic missions and components that can survive inside Venus' atmosphere for prolonged periods of time. These include the [next-generation electronics](#) that researchers from NASA Glenn Research Center (GRC) recently unveiled. These electronics would allow a lander to explore Venus surface for weeks, months, or even years.

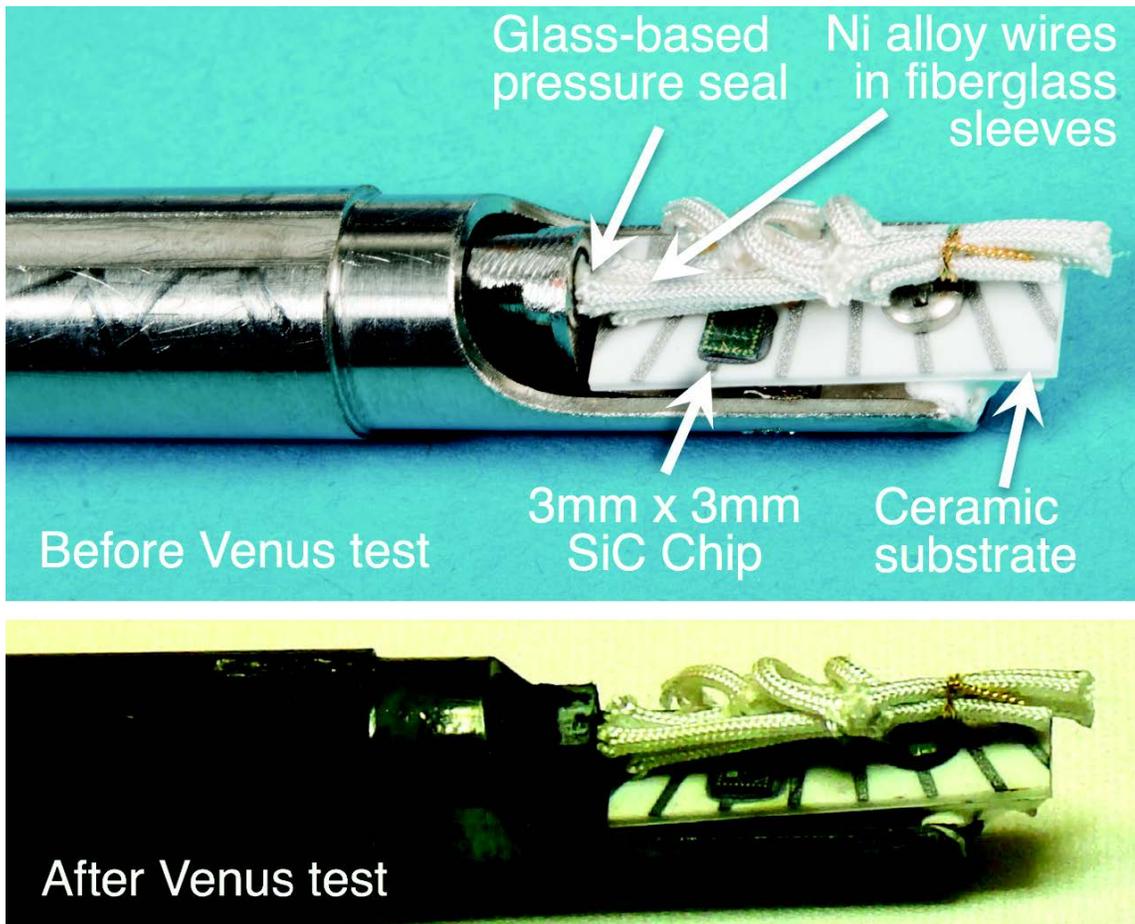
In the past, landers developed by the Soviets and NASA to explore Venus – as part of the [Venera](#) and [Mariner](#) programs, respectively – relied on standard electronics, which were based on silicon semiconductors. These are simply not capable of operating in the temperature and pressure conditions that exist on the surface of Venus, and therefore required that they have protective casings and cooling systems.

Naturally, it was only a matter of time before these protections failed and the probes stopped transmitting. The record was achieved by the Soviets with their [Venera 13](#) probe, which transmitted for 127 minutes between its descent and landing. Looking ahead, NASA and other space agencies want to develop probes that can gather as much information as they can on Venus's atmosphere, surface, and geological history before they time out.

To do this, a team from NASA's GRC has been working to develop electronics that rely on silicon carbide (SiC) semiconductors, which would be capable of operating at or above Venus' temperatures. Recently, the team conducted a demonstration using the world's first moderately-complex SiC-based microcircuits, which consisted of tens or more transistors in the form of core digital logic circuits and analog operation amplifiers.

These circuits, which would be used throughout the electronic systems of a future mission, were able to operate for up to 4000 hours at temperatures of 500 °C (932 °F) – effectively demonstrated that they could survive in Venus-like conditions for prolonged periods. These tests took place in the [Glenn Extreme Environments Rig](#) (GEER), which simulated Venus’ surface conditions, including both the extreme temperature and high pressure.

Back in April of 2016, the GRC team tested a SiC 12-transistor ring oscillator using the GEER for a period of 521 hours (21.7 days). During the test, they raised they subjected the circuits to temperatures of up to 460 °C (860 °F), atmospheric pressures of 9.3 MPa and supercritical levels of CO<sup>2</sup> (and other trace gases). Throughout the entire process, the SiC oscillator showed good stability and kept functioning.



This test was ended after 21 days due to scheduling reasons, and could have gone on much longer. Nevertheless, the duration constituted a significant world record, being orders of magnitude longer than any other demonstration or mission that has been conducted. Similar tests have shown that ring oscillator circuits can survive for thousands of hours at temperatures of 500 °C (932 °F) in Earth-air ambient conditions.

Such electronics constitute a major shift for NASA and space exploration, and would enable missions that were previously impossible. NASA’s [Science Mission Direction](#) (SMD) plans to incorporate SiC electronics on their [Long-Life In-situ Solar System Explorer](#) (LLISSE). A prototype is currently being developed for this low-cost concept, which would provide basic, but highly valuable scientific measures from the surface of Venus for months or longer.

Other plans to build a survivable Venus explorer include the [Automaton Rover for Extreme Environments](#) (AREE), a “[steampunk rover](#)” concept that relies on analog components rather than complex electronic systems. Whereas this concepts seeks to do away with electronics entirely to ensure a Venus

mission could operate indefinitely, the new SiC electronics would allow more complex rovers to continue operating in extreme conditions.

Beyond Venus, this new technology could also lead to new classes of probes capable of exploring within gas giants – i.e. Jupiter, Saturn, Uranus and Neptune – where temperature and pressure conditions have been prohibitive in the past. But a probe that relies on a hardened shell and SiC electronic circuits could very well penetrate deep into the interior of these planets and reveal startling new things about their atmospheres and magnetic fields.

The surface of Mercury could also be accessible to rovers and landers using this new technology – even the day-side, where temperatures reach a high of 700 K (427 °C; 800 °F). Here on Earth, there are plenty of extreme environments that could now be explored with the help of SiC circuits. For example, drones equipped with SiC electronics could monitor deep-sea oil drilling or explore deep into the Earth's interior.

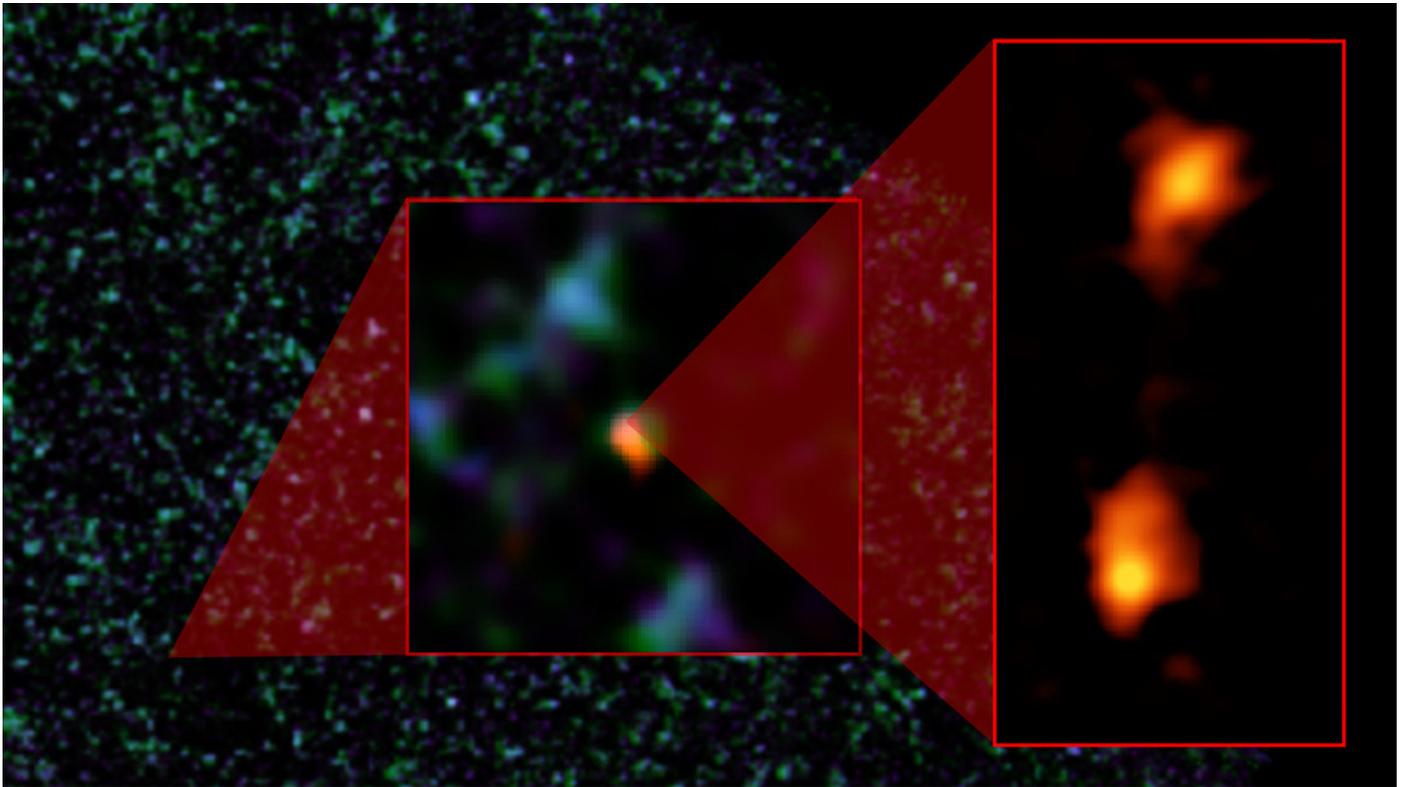
There are also commercial applications involving aeronautical engines and industrial processors, where extreme heat or pressure traditionally made electronic monitoring impossible. Now such systems could be made “smart”, where they are capable of monitoring themselves instead of relying on operators or human oversight.

With extreme circuits and (someday) extreme materials, just about any environment could be explored. Maybe even the interior of a star!

Source: [Universe Today](#)

[Return to Contents](#)

### 3. Duo of titanic galaxies captured in extreme starbursting merger



*Composite image of ADFS-27 galaxy pair. The background image is from ESA's Herschel Space Observatory. The object was then detected by ESO's Atacama Pathfinder EXperiment (APEX) telescope (middle image). ALMA (right) was able to identify two galaxies: ADFS-27N (for North) and ADFS-27S (for South). The starbursting galaxies are about 12.8 billion light-years from Earth and destined to merge into a single, massive galaxy. Credit: NRAO/AUI/NSF, B. Saxton; ESA Herschel; ESO APEX; ALMA (ESO/NAOJ/NRAO); D. Riechers*

New observations with the Atacama Large Millimeter/submillimeter Array (ALMA) have uncovered the never-before-seen close encounter between two astoundingly bright and spectacularly massive galaxies in the early universe. These so-called hyper-luminous starburst galaxies are exceedingly rare at this epoch of cosmic history—near the time when galaxies first formed—and may represent one of the most-extreme examples of violent star formation ever observed.

Astronomers captured these two interacting [galaxies](#), collectively known as ADFS-27, as they began the gradual process of merging into a single, massive elliptical galaxy. An earlier sideswiping encounter between the two helped to trigger their astounding bursts of star formation. Astronomers speculate that this merger may eventually form the core of an entire galaxy cluster. Galaxy clusters are among the most massive structures in the universe.

"Finding just one hyper-luminous starburst galaxy is remarkable in itself. Finding two of these rare galaxies in such close proximity is truly astounding," said Dominik Riechers, an [astronomer](#) at Cornell University in Ithaca, New York, and lead author on a paper appearing in the *Astrophysical Journal*. "Considering their extreme distance from Earth and the frenetic star-forming activity inside each, it's possible we may be witnessing the most intense galaxy merger known to date."

The ADFS-27 galaxy pair is located approximately 12.7 billion light-years from Earth in the direction of the Dorado constellation. At this distance, astronomers are viewing this system as it appeared when the universe was only about one billion years old.

Astronomers first detected this system with the European Space Agency's Herschel Space Observatory. It appeared as a single red dot in the telescope's survey of the southern sky. These initial observations suggested that the apparently faint object was in fact both extremely bright and extremely distant. Follow-up observations with the Atacama Pathfinder EXperiment (APEX) telescope confirmed these initial interpretations and paved the way for the more detailed ALMA observations.

With its higher resolution and greater sensitivity, ALMA precisely measured the distance to this object and revealed that it was in fact two distinct galaxies. The pairing of otherwise phenomenally rare galaxies suggests that they reside within a particularly dense region of the universe at that period in its history, the astronomers said.

The new ALMA observations also indicate that the ADFS-27 system has approximately 50 times the amount of star-forming gas as the Milky Way. "Much of this gas will be converted into new stars very quickly," said Riechers. "Our current observations indicate that these two galaxies are indeed producing stars at a breakneck pace, about one thousand times faster than our home galaxy."

The galaxies—which would appear as flat, rotating disks—are brimming with extremely bright and massive blue stars. Most of this intense starlight, however, never makes it out of the galaxies themselves; there is simply too much obscuring interstellar dust in each.

This dust absorbs the brilliant starlight, heating up until it glows brightly in infrared light. As this light travels the vast cosmic distances to Earth, the ongoing expansion of the universe shifts the once infrared light into longer millimeter and submillimeter wavelengths, all thanks to the Doppler effect.

ALMA was specially designed to detect and study light of this nature, which enabled the astronomers to resolve the source of the light into two distinct objects. The observations also show the basic structures of the galaxies, revealing tail-like features that were spun-off during their initial encounter.

The new observations also indicate that the two galaxies are about 30,000 light-years apart, moving at roughly several hundred kilometers per second relative to each other. As they continue to interact gravitationally, each galaxy will eventually slow and fall toward the other, likely leading to several more close encounters before merging into one massive, elliptical galaxy. The astronomers expect this process to take a few hundred million years.

"Due to their great distance and dustiness, these galaxies remain completely undetected at visible wavelengths," noted Riechers. "Eventually, we hope to combine the exquisite ALMA data with future infrared observations with NASA's James Webb Space Telescope. These two telescopes will form an astronomer's 'dream team' to better understand the nature of this and other such exceptionally rare, extreme systems."

Source: [Phys.org](http://Phys.org)

[Return to Contents](#)

# The Night Sky

## Tuesday, November 14

- Once you've found Beta Ceti (see yesterday), you're on the way to the Silver Coin Galaxy, NGC 253 in Sculptor. It's 7° south of Beta Ceti, a little more than the width of a typical binocular's field of view. But you'll want a detailed chart to determine the exact position to examine among the faint foreground stars — such as the chart in Matt Wedel's Binocular Highlight column in the [November Sky & Telescope](#), page 43.

The galaxy is 7th magnitude but large and diffuse, so a really dark sky is a big help. Under excellent sky conditions, binoculars show it easily. It appears "obviously elongated, distinctly brighter in the western half," writes Wedel.

- As dawn begins on Wednesday morning the 15th, the waning crescent Moon forms a triangle with Mars to its upper right and Venus to its lower right, as shown here.

## Wednesday, November 15

- As Thursday's dawn brightens, the very thin waning crescent Moon hangs about 6° above Jupiter (for North America) and 10° lower left of Spica, as shown here. Venus is 3° lower left of Jupiter. You'll find Mars 9° above Spica.

## Thursday, November 16

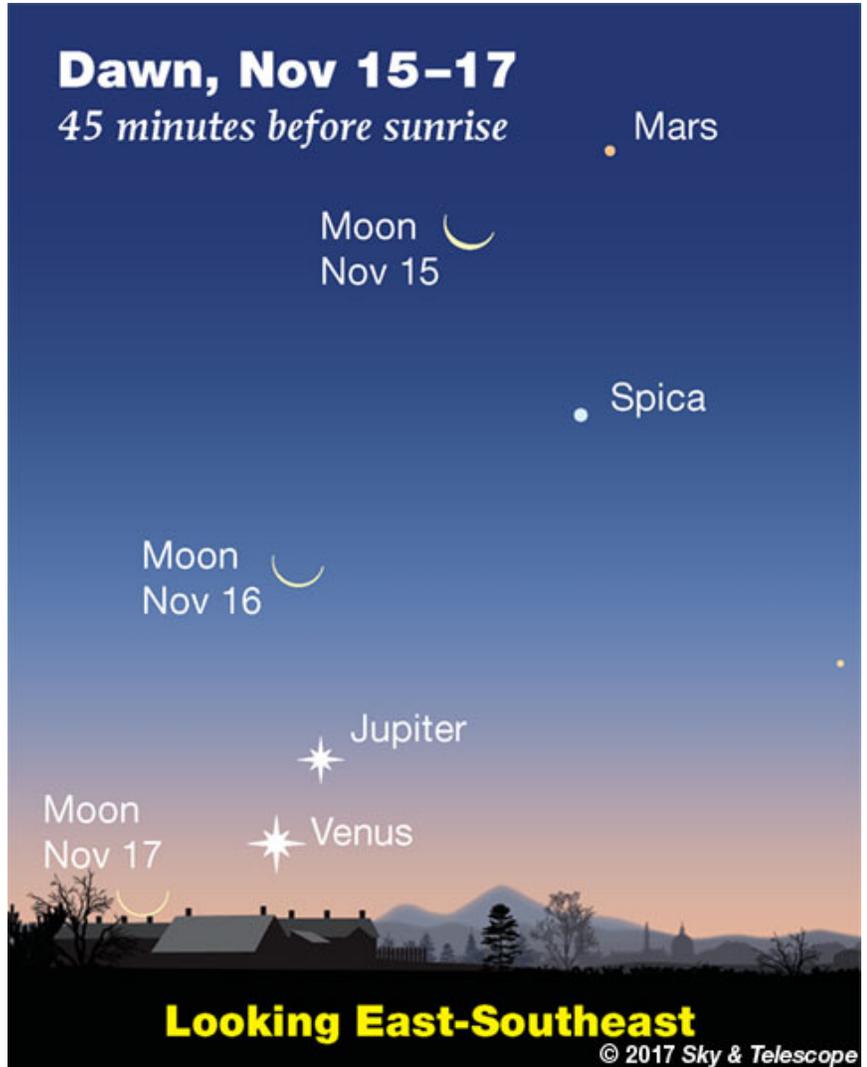
- As dawn brightens on Friday the 17th, a hair-thin Moon (only about 24 hours from new for North America) hides about 4° left or lower left of Venus, as shown here. Bring binoculars and sharp eyes! Upper right of Venus is Jupiter.

## Friday, November 17

- Two challenge planets! As twilight fades, look low in the southwest for Saturn and Mercury, as shown here. They're about a fist at arm's length apart. Binoculars help.

- With the Moon not yet back in the evening sky, take advantage of the dark nights to explore the galaxies inside the northwest corner of the Great Square of Pegasus — they're magnitudes 11 to 13 — using your 6-inch or larger scope and Sue French's Deep-Sky Wonders article, chart and photos in the [November Sky & Telescope](#), page 55.

Source: [Sky & Telescope](#)



# ISS Sighting Opportunities

[For Denver:](#)

Date	Visible	Max Height	Appears	Disappears
Tue Nov 14, 5:28 AM	3 min	34°	17° above NNW	26° above ENE
Wed Nov 15, 4:39 AM	1 min	21°	21° above NE	15° above ENE
Wed Nov 15, 6:11 AM	5 min	50°	10° above WNW	17° above SSE
Thu Nov 16, 5:21 AM	3 min	78°	36° above NW	28° above ESE
Fri Nov 17, 4:31 AM	< 1 min	26°	26° above E	22° above E
Fri Nov 17, 6:04 AM	5 min	19°	10° above W	10° above S

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

## NASA-TV Highlights

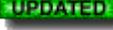
(all times Eastern Daylight Time)

**4 a.m., Wednesday, November 15** - Launch Coverage of Joint Polar Satellite System (JPSS-1) from Vandenberg AFB, California (starts at 4:15 a.m.) (all channels)

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

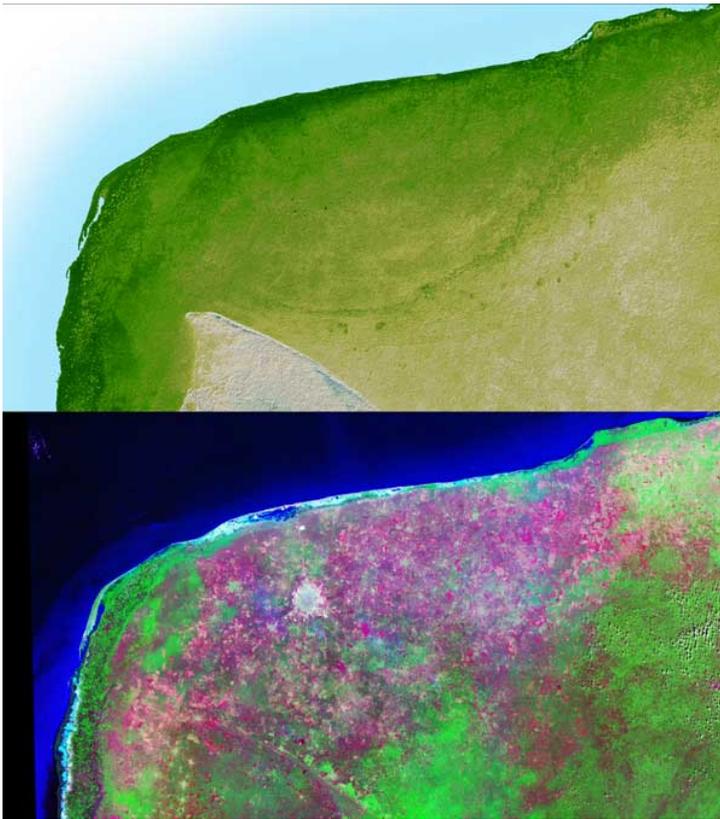
[Return to Contents](#)

# Space Calendar

- Nov 14 -  [Nov 07] [Joint Polar Satellite System 1 \(JPSS 1\)](#)/ [Buccaneer RMM](#)/ [MiRaTA](#)/ [CP 7\(DAVE\)](#)/ [EagleSat](#)/ [Fox 1B \(RadFxSat\)](#)/ [MakerSat 0 Delta 2 Launch](#)
- Nov 14 - [Moon Occults Asteroid 21 Lutetia](#)
- Nov 14 - [Asteroid 2873 Binzel](#) Closest Approach To Earth (1.540 AU)
- Nov 14 - [Asteroid 144296 Steviewonder](#) Closest Approach To Earth (1.682 AU)
- Nov 15 - [Fengyun 3D/Head-1 CZ-4C Launch](#)
- Nov 15 -  [Nov 12] ["Zuma" Falcon 9 Launch](#)
- Nov 15 - [Comet 73P-BF/Schwassmann-Wachmann At Opposition](#) (2.604 AU)
- Nov 15 - [Comet C/2014 C1 \(TOTAS\) At Opposition](#) (2.693 AU)
- Nov 15 - [Comet 302P/Lemmon-PANSTARRS Closest Approach To Earth](#) (3.058 AU)
- Nov 15 - [Comet 73P-AJ/Schwassmann-Wachmann At Opposition](#) (3.837 AU)
- Nov 15 - [Comet 218P/LINEAR At Opposition](#) (4.021 AU)
- Nov 15 - [Asteroid 3154 Grant](#) Closest Approach To Earth (1.574 AU)
- Nov 15 - [Asteroid 19535 Rowanatkinson](#) Closest Approach To Earth (1.612 AU)
- Nov 15 - [Asteroid 228029 MANIAC](#) Closest Approach To Earth (1.813 AU)
- Nov 15 - [Kuiper Belt Object 2012 VP113 At Opposition](#) (82.645 AU)
- Nov 16 - [Moon Occults Asteroid 4 Vesta](#)
- Nov 16 - [Comet C/2017 S6 \(Catalina\) At Opposition](#) (1.265 AU)
- Nov 16 - [Comet 62P/Tsuchinshan Perihelion](#) (1.384 AU)
- Nov 16 - [Comet C/2017 E1 \(Borisov\) At Opposition](#) (2.399 AU)
- Nov 16 - [Comet 73P-BD/Schwassmann-Wachmann At Opposition](#) (2.696 AU)
- Nov 16 - [Comet P/2015 J3 \(NEOWISE\) At Opposition](#) (4.175 AU)
- Nov 16 - [Apollo Asteroid 2000 UO30 Near-Earth Flyby](#) (0.074 AU)
- Nov 16 - [Apollo Asteroid 2013 TK69 Near-Earth Flyby](#) (0.082 AU)
- Nov 16 -  [Nov 13] [Aten Asteroid 2017 VD2](#) Near-Earth Flyby (0.100 AU)
- Nov 16 - [Asteroid 23638 Nagano](#) Closest Approach To Earth (1.301 AU)
- Nov 16 - [Asteroid 24997 Petergabriel](#) Closest Approach To Earth (1.418 AU)
- Nov 16 - [Asteroid 2919 Dali](#) Closest Approach To Earth (2.422 AU)
- Nov 16 - [Centaur Object 54598 Bienor At Opposition](#) (14.172 AU)
- Nov 16 - [Lecture: Mars 2020 or There and Back Again](#), Pasadena, California
- Nov 16 - 40th Anniversary (1977), ["Close Encounters of the Third Kind"](#) Released
- Nov 16 - 165th Anniversary (1852), [Hermann Goldschmidt's](#) Discovery of [Asteroid 21 Lutetia](#)
- Nov 16 - [Jean le Rond d'Alembert's](#) 300th Birthday (1717)
- Nov 17 - 50th Anniversary (1967), 1st Successful Lift-Off from Lunar Surface ([Surveyor 6](#))
- Nov 17 -  [Nov 13] [Leonids Meteor Shower](#) Peak
- Nov 17 - [Comet 24P/Schaumasse Perihelion](#) (1.206 AU)
- Nov 17 - [Comet 73P-BR/Schwassmann-Wachmann At Opposition](#) (2.654 AU)
- Nov 17 - [Comet 73P-BG/Schwassmann-Wachmann At Opposition](#) (2.685 AU)
- Nov 17 - [Apollo Asteroid 444584 \(2006 UK\) Near-Earth Flyby](#) (0.022 AU)
- Nov 17 - [Aten Asteroid 136818 Selqet Closest Approach To Earth](#) (0.325 AU)
- Nov 17 - [Asteroid 1288 Santa](#) Closest Approach To Earth (1.810 AU)
- Nov 17 - [Neptune Trojan 2007 VL305 At Opposition](#) (27.240 AU)
- Nov 17 - [Plutino 455502 \(2003 UZ413\) At Opposition](#) (42.874 AU)
- Nov 17 - [Henry Gellibrand's](#) 420th Birthday (1597)

# Food for Thought

## Dinosaur Killing Asteroid Hit Earth in Exactly the Wrong Spot



Sixty-six million years ago, an asteroid struck Earth in what is now the Yucatan Peninsula in southern Mexico. This event, known as the Chicxulub asteroid impact, measured 9 km in diameter and caused extreme global cooling and drought. This led to a mass extinction, which not only claimed the lives of the dinosaurs, but also wiped out about 75% of all land and sea animals on Earth.

However, had this asteroid impacted somewhere else on the planet, things could have turned out very differently. According to a [new study](#) produced by a team of Japanese researchers, the destruction caused by this asteroid was due in large part to where it impacted. Had the Chicxulub asteroid landed somewhere else on the planet, they argue, the fallout would not have been nearly as severe.

The study, which recently appeared in the journal *Scientific Reports*, is titled "[Site of asteroid impact changed the history of life on Earth: the low probability of mass extinction](#)", and was conducted by Kunio Kaiho and Naga Oshima of [Tohoku University](#) and the [Meteorological Research Institute](#),

respectively. For the sake of their study, the pair considered how geological conditions in the Yucatan region were intrinsic to mass extinction that happened 66 million years ago.

Dr. Kaiho and Dr. Oshima began by considering recent studies that have shown how the Chicxulub impact heated the hydrocarbon and sulfur content of rocks in the region. This is what led to the formation of stratospheric soot and sulfate aerosols which caused the extreme global cooling and drought that followed. As they state in their study, it was this (not the impact and the detritus it threw up alone) that ensured the mass extinction that followed:

*"Blocking of sunlight by dust and sulfate aerosols ejected from the rocks at the site of the impact (impact target rocks) was proposed as a mechanism to explain how the physical processes of the impact drove the extinction; these effects are short-lived and therefore could not have driven the extinction. However, small fractions of stratospheric sulfate (SO<sub>4</sub>) aerosols were also produced, which may have contributed to the cooling of the Earth's surface."*

Another issue they considered was the source of the soot aerosols, which previous research has indicated were quite prevalent in the stratosphere during the Cretaceous/Paleogene (K–Pg) boundary (ca. 65 million years ago). This soot is believed to coincide with the asteroid impact since microfossil and fossil pollen studies of this period also indicate the presence of iridium, which has been traced to the Chicxulub asteroid.

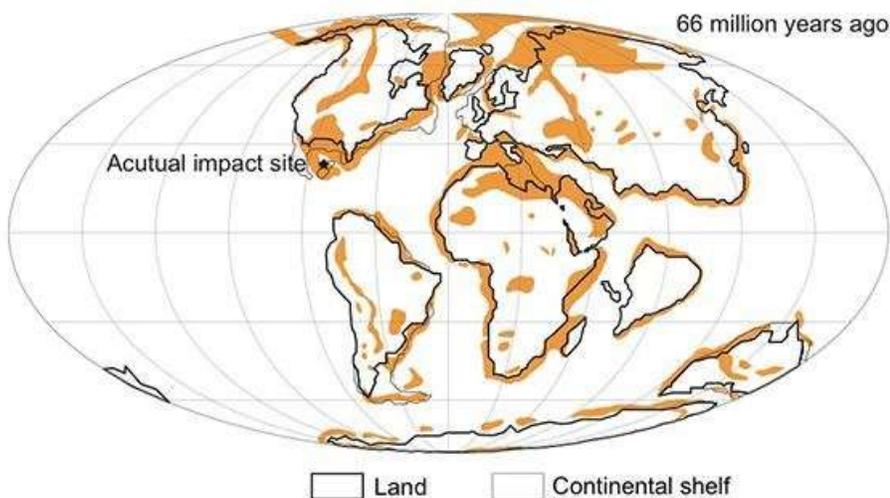
Previously, this soot was believed to be the result of wildfires that raged in the Yucatan as a result of the asteroid impact. However, Kaiho and Oshima determined that these fires could not have resulted in stratospheric soot; instead positing that they could only be produced by the burning and ejecting of hydrocarbon material from rocks in the impact target area.

The presence of these hydrocarbons in the rocks indicate the presence of both oil and coal, but also plenty of carbonate minerals. Here too, the geology of the Yucatan was key, since the larger geological formation known as the Yucatan Platform is known to be composed of carbonate and soluble rocks – particularly limestone, dolomite and evaporites.

To test just how important the local geology was to the mass extinction that followed, Kaiho and Oshima conducted a computer simulation that took into account where the asteroid struck and how much aerosols and soot would be produced by an impact. Ultimately, they found that the resulting ejecta would have been sufficient to trigger global cooling and drought; and hence, an Extinction Level Event (ELE).

This sulfur and carbon-rich geology, however, is not something the Yucatan Peninsula shares with most regions on the planet. As they state in their study:

*“Here we show that the probability of significant global cooling, mass extinction, and the subsequent appearance of mammals was quite low after an asteroid impact on the Earth’s surface. This significant event could have occurred if the asteroid hit the hydrocarbon-rich areas occupying approximately 13% of the Earth’s surface. The site of asteroid impact, therefore, changed the history of life on Earth.”*



Basically, Kaiho and Oshima determined that 87% of Earth would not have been able to produce enough sulfate aerosols and soot to trigger a mass extinction. So if the Chicxulub asteroid struck just about anywhere else on the planet, the dinosaurs and most of the world’s animals would have likely survived, and the resulting macroevolution of mammals probably would not have taken place.

In short, modern hominids may very well owe their existence to the fact that the Chicxulub asteroid landed where it did. Granted, the majority of life in the Cretaceous/Paleogene (K–Pg) was wiped out as a result, but ancient mammals and their progeny appear to have lucked out. The study is therefore immensely significant in terms of our understanding of how asteroid impacts affect climatological and biological evolution.

It is also significant when it comes to anticipating future impacts and how they might affect our planet. Whereas a large impact in a sulfur and carbon-rich geological region could lead to another mass extinction, an impact anywhere else could very well be containable. Still, this should not prevent us from developing appropriate countermeasures to ensure that large impacts don’t happen at all!

Source: [Universe Today](#)

[Return to Contents](#)

## Space Image of the Week



### **Earth as Viewed From 10,000 Miles**

On November 9, 1967, the uncrewed Apollo 4 test flight made a great ellipse around Earth as a test of the translunar motors and of the high speed entry required of a crewed flight returning from the Moon. A 70mm camera was programmed to look out a window toward Earth, and take a series of photographs from "high apogee." Seen looking west are coastal Brazil, the Atlantic Ocean, West Africa and Antarctica. This photograph was made as the Apollo 4 spacecraft, still attached to the S-IVB (third) stage, orbited Earth at an altitude of 9,544 miles.

Source: [NASA](#)

[Return to Contents](#)