



## Venus? Maybe Later.

### Article

#### PART 1

**TOKYO, Japan.** A Japanese space probe was supposed to insert itself into orbit around Venus in December 2010, but it missed. Instead, the probe was captured by the sun's gravitational pull. While this was a huge setback for Japan's space program, all is not lost. The probe may be able to continue the mission to Venus in six years.

After journeying for nearly eight months to reach the second planet, Venus, the probe, named Akatsuki, was expected to enter an elliptical orbit around the planet. To do this, Akatsuki needed to fire its engines as it neared Venus, pushing it into the proper orbit. Mission officials said they briefly lost contact with the probe. The next day, officials were able to determine that Akatsuki's engines malfunctioned and did not fire for a long enough period of time. This prevented the probe from attaining the desired orbiting position around Venus.

Still, it wasn't all bad news. Officials said communication with the probe had been restored. Akatsuki appeared to be intact and functioning. The probe had passed Venus and headed off to orbit the sun. Officials hope that Akatsuki's engines will fire correctly when the probe nears Venus again.

"Unfortunately, [Akatsuki] did not attain an orbit [around Venus]," said Hitoshi Soeno of JAXA, Japan's space agency. "But it appears to be functioning, and we may be able to try again when it passes by Venus six years from now."

Akatsuki was designed to monitor volcanic activity on Venus. In addition, its mission was to provide data on Venus' thick cloud cover and climate, including whether the planet has lightning. The probe was equipped with infrared cameras and other instruments to gather this information.

Scientists hoped that by monitoring the climate of Venus, more could be learned about how climate change works. Climate change involves change in weather over long periods of time and is thought to affect the atmosphere. Looking at this process on another planet may give scientists clues about what is happening on Earth. It may help scientists know more about what is causing a gradual increase in temperatures on Earth.

The probe, which cost \$300 million, would have been the first that Japan had put in orbit around another planet. Japanese scientists were extremely hopeful that the Venus probe would be successful, since the country recently brought a probe back from a trip to an asteroid. The failure of the Venus probe, at least for now, was a big letdown for Japan and a disappointment for scientists around the world.

"The Planetary Society regrets that the innovative Akatsuki spacecraft seems to have missed its opportunity to lock into an orbit of Venus," said Bill Nye. Nye is the executive director of the Planetary Society, which is a U.S.-based private group that supports space exploration. "Although Akatsuki has already accomplished some remarkable things on its voyage, this setback reminds us how difficult space exploration can be."

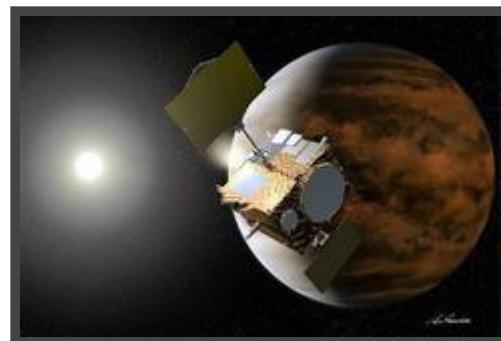


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AP/Akihiro Ikeshita via JAXA

*The Japan Aerospace Exploration Agency (JAXA) sent a space probe to study Earth's neighbor, the planet Venus. The vessel was not able to enter Venus' orbit and won't be able to attempt to do so again for six years.*

*The Associated Press contributed to this story.*

## **PART 2**

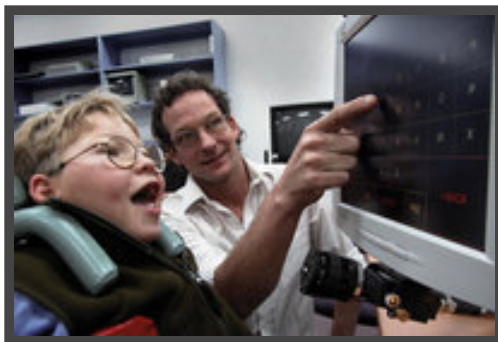
### **Dig Deeper**

The Akatsuki probe failed to enter Venus' orbit in 2010. JAXA plans to try again in December 2015. JAXA and other space agencies know that space exploration benefits us in many ways. Throughout history, the study of stars and planets has inspired new ideas. As we meet the challenges of space exploration, we gain valuable technology.

The study of other worlds can teach us about our own. Scientists believe that Earth has changed a great deal since its formation. By comparing Earth with other planets, scientists can learn more about the history of Earth's surface features and atmosphere. Scientists are hopeful that Akatsuki's second attempt will be able to study the climate on Venus. This could help them learn more about the changes occurring in Earth's climate.

But space exploration has done more than add to our knowledge. It has also provided us with technology that makes life on Earth easier. Each day you probably benefit from some material or product that was developed for the space program. What is one of the most important benefits of space exploration? It has been the development of satellite technology. Images and data from weather satellites have greatly improved weather forecasting. Other satellites collect images of Earth's surface. The images show how the surface is being changed. It is being changed by natural events and human activity. The data can be used for things like wildlife preservation and conservation of natural resources.

Maybe you have come up with a new way to use something that was made for a different purpose. Many technologies have been created to meet space travel needs. Engineers at NASA, the U.S. space agency, often repurpose space technologies to improve life on Earth. Did you know that smoke detectors are spinoffs of space technology? Cold weather gloves, bed mattresses, and ear thermometers are, too. Everything on a spacecraft must be small. It needs to be as lightweight as possible. Why? Because the heavier a spacecraft, the harder it is to launch. Engineering design techniques have been developed to meet this need. They have also improved devices used on Earth. Some tools for diagnosing diseases are examples; so are some devices that help people overcome disabilities.



Credit: NASA

*NASA engineers helped develop a system that allows this boy to communicate by using eye movements.*

Materials and parts on a spacecraft have to handle harsh conditions. Some of these conditions are extreme heat and cold. Fire-resistant materials were developed for the space program. Many homes and buildings contain these fire-resistant materials. Firefighters wear protective suits. They are made from fabric originally used in space suits. NASA engineers have also helped design devices that allow firefighters to avoid injury from inhaling smoke. Humans need a safe environment in spacecraft and space stations. NASA has developed systems for purifying air, water, and food. These systems now help protect people on Earth as well as in space.

### **Dictionary**

**elliptical** (*adjective*) oval-shaped

**infrared** (*adjective*) having to do with invisible light that has a heating effect

**innovative** (*adjective*) creative, especially in the way that something is done

**intact** (*adjective*) not damaged

**malfunction** (*verb*) to fail to work properly

**satellite** (*noun*) an object that orbits a more massive object

**technology** (*noun*) the use of scientific knowledge to solve problems or engineer new products, tools, or processes

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## Activity

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### PART 1

#### Question 1

Which of these had **not** yet happened when this article was written?

- (A) Japan's space probe Akatsuki entered an orbit around the planet Venus and began monitoring volcanic activity.
- (B) Japan's space probe Akatsuki missed the orbit around the planet Venus and was captured by the sun's gravitational pull.
- (C) Japanese officials restored communications with Akatsuki, and it appeared to be intact and functioning.
- (D) Japanese scientists designed Akatsuki to monitor volcanic activity on Venus and provide data on Venus' thick cloud cover.

#### Question 2

What is this article mainly about?

- (A) Bill Nye is the executive director of the Planetary Society, a private group that supports space exploration.
- (B) Japan sent a space probe to study Venus, but the probe malfunctioned and won't be near Venus again for six years.
- (C) Akatsuki cost \$300 million to build and was designed to orbit and study another planet.
- (D) Japanese scientists hope that the climate of Venus can teach us about how climate change works.

#### Question 3

The article states:

**Officials said communication with the probe had been restored. Akatsuki appeared to be intact and functioning.**

Which would be the closest **synonym** for the word *functioning*?

- (A) Operational
- (B) Descending
- (C) Prepared
- (D) Focused

#### Question 4

According to the article, why did Akatsuki miss Venus?

- (A) The climate changed when the engines were supposed to fire, and the atmosphere was affected around Venus.
- (B) The engines were designed to monitor volcanic activity and provide data, not to orbit around Venus.
- (C) The engines did not fire long enough, which prevented the probe from attaining the desired orbiting position.
- (D) The infrared cameras and other instruments designed to gather information on the probe malfunctioned.

#### Question 5

Based on the article, which is most likely to happen next?

- (A) Japan will redirect its studies away from Venus and toward learning about Earth's gravitational pull.
- (B) Japanese scientists will monitor Akatsuki closely and hope that the engines fire correctly when it passes by Venus six years from now.
- (C) Japanese scientists will design a probe to replace Akatsuki with engines that will fire correctly when orbiting the sun.
- (D) Japan will shut down JAXA, its space agency, until a space probe can successfully navigate Venus.

Question 6

Which is the closest **synonym** for the word *intact*?

- (A) Unbalanced
- (B) Unharmed
- (C) Reinforced
- (D) Overhauled

Question 7

Which question is **not** answered by the article?

- (A) What other space projects is JAXA planning to pursue?
- (B) What did scientists hope to learn by studying the climate of Venus?
- (C) What alternate path has Akatsuki taken in space?
- (D) What is the reason that Akatsuki missed Venus?

Question 8

Which of these statements should **not** be included in a summary of this article?

- (A) Officials were able to determine that Akatsuki's engines malfunctioned and did not fire for a long enough period of time.
- (B) Instead of entering the orbit of Venus, the Japanese probe Akatsuki was captured by the sun's gravitational pull.
- (C) A Japanese space probe was supposed to orbit around Venus in December 2010, but it missed.
- (D) Bill Nye is the executive director of the Planetary Society, which supports space exploration.