

- seds.lpl.arizona.edu/nineplanets/nineplanets/venus.html
This site presents some of the mythology associated with Venus as well as many images and other information about the planet.
- liftoff.msfc.nasa.gov/
This site was developed for teenagers interested in space missions. It contains news updates and background information on NASA's missions.
- volcano.und.nodak.edu/vwdocs/planet_volcano/venus/intro.html
"Volcano World" discusses the different kinds of volcanoes found on Venus along with their complex features, and provides a map of the volcanoes on its surface.
- stardate.org/resources/ssguide/venus.html
"StarDate" provides an enormous amount of information on Venus.

Suggested Print Resources

- Cole, Michael. *Venus: The Second Planet*. Enslow Publishers, Berkeley Heights, NJ; 2001.
- Dickinson, Terrence. *NightWatch: A Practical Guide to Viewing the Universe*. Firefly Books, Westport, CT; 1998.
- Grinspoon, David Harry. *Venus*. Yale University Press, New Haven, CT; 1998.

TEACHER'S GUIDE

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COMPLETE LIST OF TITLES

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| • 21ST CENTURY COSMOS | • THE SEARCH FOR NEW PLANETS |
| • THE CASE FOR MARS | • STELLAR EVOLUTION |
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The Enigma of Venus

Grades 9–12

This series tells the stories behind the science of astronomy in an informative and entertaining way. Fast-paced and visually rich, viewers journey to exotic destinations within our solar system from moons and planets to comets and asteroids. Featuring advances in scientific investigation, this series investigates cosmic mysteries including the birth and death of stars, the structure of the universe, and the search for extraterrestrial life.

This guide provides a brief synopsis of the program, background on the science concepts presented in the show, discussion topics, activities, vocabulary and additional resources.



Program Summary

The contrasts between Earth and Venus almost defy explanation. The two planets are about the same size and mass, and they are made of roughly the same material. Yet Venus is perpetually cloud-covered, is completely without water, is hotter than a self-cleaning oven, and is riddled with geological features for which few counterparts exist on Earth.

Venus may be a perplexing study now, but it was a complete mystery before the space age. Observing the nearest planet to Earth was an exercise in frustration. Some people turned the frustration into fantasy, imagining a swampy fictional world with strange, loving life forms. As more and more information was gleaned from planetary probes, science fiction slowly gave way to fact, and truth turned out to be stranger than fiction.

The Sun's second planet is a dark, broiling hell — a global greenhouse with a broken thermostat. It is a high pressure, volcanic world whose lava-strewn surface sears at about 500 degrees Celsius. The dense Venusian atmosphere is choked with carbon dioxide gas and sulfuric acid. The planet spins on its axis incredibly slowly; more than 243 days go by on Earth while Venus turns just once. Not only that, but compared to every other planet in the solar system, Venus turns backwards. Scientists are perplexed by this strange world.

The planet displays no land units that resemble our continents and therefore exhibits no continental drift, the process by which earthquakes and volcanoes are formed. This makes the one recognizable feature that Venus has in abundance — volcanoes — an enigma all its own. The Venusian surface is thoroughly volcanic in nature, yet none of the volcanic cones seems to be active today. All the evidence collected from spacecraft reconnaissance indicates that the volcanoes of Venus stopped cold about 500 million years ago. Why? Scientists are trying to answer countless unanswered questions about our sister planet's history in the hope of learning about our home planet.

What we do know is that Venus has at least one vital lesson for us. On our planet scientists warn of the detrimental effects of global warming. On Venus, the greenhouse effect has gone out of control without the aid of humans burning fossil fuels.

Spacecraft designers are looking for ways of getting instruments to Venus while minimizing their exposure to the harsh conditions at the surface. One novel solution would be a craft that would neither land on the planet nor go into orbit. Instead, it would float through the atmosphere. This intriguing mission concept involves a balloon-like probe called an "aerobot." It would arrive at Venus via spacecraft, then drop gently into the planet's atmosphere. The aerobot would rise and sink on command, and drift around the globe with the Venusian winds. Since the temperature on the surface is too hot for most of our instruments, the aerobot would descend for only a limited time, take measurements, then rise to a higher altitude and cool off.

Vocabulary

"greenhouse effect" — The process of general planetary warming caused by energy passing through the atmosphere of a planet and getting trapped.

infrared — Radiation with slightly longer wavelengths and slightly lower frequencies than those of visible light.

Magellan mission — The low budget U.S. spacecraft that was released from the space shuttle Atlantis in 1989, headed on a fifteen-month journey to Venus. From its orbit around Venus, Magellan used radar waves to survey the surface of the planet. After four years, scientists had enough data to create amazing pictures of the strange world.

Mariner 2 — U.S. space probe that flew by Venus in 1962 and confirmed the high temperature on the surface.

Pioneer Venus — U.S. space probe that used radar to map the surface of Venus in 1978.

NASA — Acronym for the National Aeronautics and Space Administration, a U.S. government agency formed in 1958 with the goal of making space exploration possible.

plate tectonics — The geological process that causes earthquakes and volcanoes on Earth.

Venera probes — A series of Soviet space probes that parachuted through the multiple cloud decks of Venus and landed softly on the surface, sending back pictures.

Activities & Discussion

- Why is the study of impact craters so important to scientists studying Venus?
- How can we learn about our own planet by studying Venus?
- What factors caused the Earth to evolve the way it did, while Venus — the planetary twin right next door — evolved into something so unearthly that no astronaut will ever go there?
- Ask students to research some of the ancient stories that surround Venus' name and share them with the class.
- If possible, have students (using solar filters and protective eyewear) observe the transit of Venus. An online source with background on this celestial event is: analyzer.depaul.edu/paperplate/Transit%20of%20Venus/Introduction.htm. If this is not practical, take students on a field trip to observe the "morning star" through a telescope.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- solarsystem.nasa.gov/features/planets/venus/venus.html
These pages from NASA's "Solar System Exploration" site present images of Venus, as well as information on the history of all space probes that traveled there and scientists who helped us learn so much about Venus. (*Continued*)