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Venus Transits Sun for Last Time This Century

JUNE SIMMS: This is SCIENCE IN THE NEWS, in VOA Special English. I'm June Simms.

SHIRLEY GRIFFITH: And I'm Shirley Griffith. Today, we tell about the planet Venus and what the American space agency is calling a once in a lifetime event. We also tell about other events of interest to sky watchers.

JUNE SIMMS: Millions of people around the world are preparing for a rare event high in the sky. Some have purchased telescopes or special equipment to witness the event. Others have organized viewing parties to watch what astronomers are calling a transit of Venus. This is when the planet Venus passes directly between the Earth and the sun. The transit of Venus will take place on June fifth and sixth. It is the last time this century that people on Earth will be able to observe Venus as it passes across the face of the sun. The next transit will take place more than one hundred years from now.

Jim Green works for the National Aeronautics and Space Administration. He directs NASA's Planetary Science Division.

JIM GREEN: "Because Venus' orbit is inclined to ours, we only see it at very special times when the two orbits connect to one another – we call nodes - and everything lines up perfectly. So this actually is the last transit that we will see in our lifetime. The next one will be in twenty one seventeen."

SHIRLEY GRIFFITH: A transit of Venus is similar to a solar eclipse of the moon, which blocks light from the sun. Venus is almost four times the size of the moon. However, it blocks less light than the moon does. As Jim Green notes, Venus's distance from us makes the planet appear much smaller.

JIM GREEN: Most of the time the size of the moon, as we see it in its orbit, is about the same angular size as the sun. And, so when it blocks it out we only see the atmosphere of the sun. But, for Venus it's so much further away and therefore it appears to be smaller."

From Earth, Venus will appear as a small black dot as it slowly moves from one edge of the sun to the other. It will take more than six hours for the planet to complete the trip.

JUNE SIMMS: Venus is the second planet from the sun and the closest planet to Earth. It also is the only planet in the solar system named for a female. The name comes from the ancient Roman goddess of love and beauty. The planet is said to have been named for her because it shone brighter than all the planets known to ancient astronomers.

In fact, people once believed Venus to be two different stars, with one appearing at sunset and the other at sunrise. That is because the planet shines with differing intensities of brightness at different times of the day.

SHIRLEY GRIFFITH: Venus has similar qualities to our planet and is often called Earth's sister. It has volcanoes, mountains, craters and sands just like Earth. The two planets are also similar in size, mass, chemistry and gravity.

Venus and the planet Mercury are called inferior planets because they are closer to the sun than the Earth. Venus is the hottest planet in our solar system, even hotter than Mercury.

NASA's Jim Green says it is even hot enough to melt lead. Although Mercury is closer to the sun, the thick atmosphere on Venus traps more of the sun's heat.

JIM GREEN: "Sunlight penetrates through the atmosphere, heats the ground on Venus and then that heat is not allowed to escape because the carbon dioxide keeps it in. It's exactly the same principle as getting into your car on a hot summer day. It's very hot inside because the heat is not allowed to go through the windows of your car but the light does."

JUNE SIMMS: The surface temperature of Venus can reach four hundred seventy degrees Celsius. NASA first documented the planet's extreme temperatures in nineteen sixty-two. The Mariner 2 spacecraft became the first successful mission to another planet when it flew close to Venus in December of that year. Jim Green says space exploration has not been the same since then.

JIM GREEN: Before nineteen sixty-two, everything that we knew about planets we got from telescopes. But from nineteen sixty-two on we've been able to fly by, orbit, land, rove and return samples all over the place, on various planets and comets and asteroids. So this has really radically changed our view of the solar system."

In nineteen seventy, the Soviet Union became the first country to land a spacecraft on Venus. Its Venera 7 spacecraft sent back twenty-three minutes of information from the surface before being destroyed by the planet's heat.

SHIRLEY GRIFFITH: Most of what we know about the qualities of Venus was discovered during and after those two historic events. However, knowledge of the Venus transit dates back centuries.

English astronomer Jeremiah Horrocks is one of two people credited with being the first to witness a Venus transit in sixteen thirty nine. He wrote of seeing a "spot of unusual magnitude and of a perfectly circular shape, which had already fully entered upon the sun's disc on the left."

Newer evidence suggests that ancient Babylonians may have witnessed a Venus transit about three thousand five hundred years ago. But that evidence cannot be confirmed.

JUNE SIMMS: NASA's Jim Green says early astronomers used Venus transit observations to help estimate the distance from the Earth to the sun, and other objects in space.

JIM GREEN: "In the early sixteen hundreds when it was first observed it was believed that the distance between the Earth and the sun was five million miles. Well, we know today that it's about ninety-three million miles. So, over time we have been able to get it right."

He also says that being able to establish the distance between the Earth and the sun was a major development in planetary research.

JIM GREEN: "That turns out to be incredibly important. That's our yardstick. We call that one astronomical unit and we measure things by that. We measure the distance to our other planets. Jupiter is five astronomical units away. Pluto is forty astronomical units away."

SHIRLEY GRIFFITH: Venus transits are extremely rare. They happen in pairs, or groups of two, every one hundred five years to one hundred twenty two years. The transits that make up the pair happen eight years apart. Jim Green says over time the celestial event repeats itself.

JIM GREEN: "It starts out every hundred and twenty-two years. And then it goes every eight years. And then it's every hundred and five years. And then it goes back to eight years. So there is indeed a pattern and it's base on the two orbits - Earth and Venus, and their orientation and their eccentricity."

The first transit in this most recent grouping took place in two thousand four. The last transit before that was in eighteen eighty-two.

Mercury also transits the sun. However, those events are much more common.

They take place about thirteen times each century.

JUNE SIMMS: NASA says there have been only seven Venus transits since the invention of the telescope in sixteen ten. It is such a rare event that very few people alive today will get another chance to see it after June sixth.

This time, the Venus transit begins on June fifth at twenty two hundred nine, Universal Time. It lasts almost seven hours, and can be seen from every continent.

People in North and South America will be able to see Venus as it **begins** moving across the sun. However, the sun will go down before Venus completes its pass. People in Europe and parts of Asia, Africa and Australia will see the **end** of the Venus transit as the sun rises in their areas.

SHIRLEY GRIFFITH: Experts warn people to follow safety rules if they plan to watch the event. They say looking directly at the sun could damage your eyes, even cause blindness. And, they say, traditional sunglasses do not provide the necessary protection.

They advise transit observers to wear special eye glasses made with lenses that help filter the sun's light. Some telescopes, binoculars and cameras also have sun filters.

Jim Green says a number of sun spots will also be visible. He says observers should be careful not to confuse the two. For computer users, there is a software app available online that will tell you the best time to watch for the Venus transit in your area. And, NASA officials have made plans for a webcast of the event from a mountainside observatory in Hilo, Hawaii. The agency says this location will provide a wonderful view of this century's last Venus transit from beginning to end.

JUNE SIMMS: Two thousand twelve has been an exciting year for celestial events. We began the year with the Quandrantid Meteor Shower in January. At the time, sixty to two hundred meteors fell toward Earth every hour.

In February, a large number of unusual fireballs were reported in skies over the United States. This yearly event is known as the "Fireballs of February."

NASA officials say the fireballs resulted from big space rocks hitting the Earth's atmosphere. Officials say what was unusual about these fireballs was how slowly they moved and how deeply they penetrated Earth's atmosphere. They were also longer lasting and brighter than other fireballs.

SHIRLEY GRIFFITH: March brought what astronomers have called the brightest Venus-Jupiter Conjunction for many years to come. A conjunction happens when two planets appear to line up close to each other in the sky. In reality, they are still millions of kilometers apart.

In April, there was another meteor shower -- this one known as Lyrids. And in May, sky watchers around the world witnessed an eclipse of the moon. The moon was as far from the Earth as it ever gets. This created the largest possible bright ring around the edges of the moon as it passed in front of the sun.

SHIRLEY GRIFFITH: I'm Shirley Griffith with June Simms, who wrote and produced this SCIENCE IN THE NEWS program. To see pictures of what astronomers have called "the Ring of Fire," and images from the Venus transit of two thousand four, visit voaspecialenglish.com. Join us again next week for more news about science in Special English on the Voice of America.