



Parker Probe Triumphs in Historic Solar Encounter

Description

In August 2018, NASA's [Parker Solar Probe](#) (PSP) embarked on an extensive mission to investigate the Sun's outer corona. Following a series of gravity-assist maneuvers with Venus, the probe shattered the distance record previously held by Helios 2, thus becoming the nearest object to the Sun on [October 29, 2018](#).

Since that time, the Parker Probe's highly elliptical trajectory has facilitated multiple excursions through the solar corona, aptly described as 'touching the Sun.' On [December 24, 2024](#), NASA announced that the probe achieved its closest proximity to the Sun, passing merely 6 million kilometers (3.8 million miles) above the solar surface—approximately 0.04 times the distance between the Earth and the Sun (0.04 AU).

In addition to surpassing its [previous distance milestone](#), the PSP traversed the solar atmosphere at a phenomenal speed of about 692,000 kilometers per hour (430,000 miles per hour), making it the fastest man-made object to date—approximately 0.064% the speed of light.

Post-flyby, the spacecraft transmitted a beacon signal on December 26, confirming its safe passage and operational status. These close encounters enable the Parker Solar Probe to conduct scientific operations that enhance our understanding of solar wind origins and evolution.

Each gravitational assist with Venus over the past six years has progressively drawn the probe nearer to the Sun within its elliptical orbit. As of [November 6, 2024](#), the spacecraft reached an optimal orbit, allowing it to study solar processes and space weather without risking damage from intense solar radiation.

To withstand the extreme temperatures of the corona, the Parker Probe employs a carbon foam shield capable of enduring temperatures ranging from 980 to 1,425 °C (1,800 to 2,600 °F). This shield also protects the spacecraft's instruments, maintaining them at room temperature to ensure their functionality in the harsh solar environment.

As Associate Administrator Nicky Fox, who leads NASA's [Science Mission Directorate](#), stated in a recent NASA [press release](#):

"Flying this close to the Sun marks a historic milestone in humanity's first mission to a star. By closely studying the Sun, we can glean insights into its effects throughout our solar system, including the technology we rely upon in daily life, and further our understanding of star functionality across the universe, aiding in the search for habitable worlds beyond our own."

Nour Rawafi, the project scientist for the Parker Solar Probe at the Johns Hopkins Applied Physics Laboratory (JHUAPL), emphasized the probe's remarkable performance: "[The] Parker Solar Probe is bravely confronting one of the most extreme environments in space and exceeding all expectations," he noted. "This mission heralds a new golden era of space exploration, bringing us closer than ever to unraveling the deepest enigmas of the Sun."

The concept of the Parker Solar Probe first emerged in a 1958 report by the [National Academy of Sciences' Space Science Board](#)

, which recommended developing a probe capable of venturing inside Mercury's orbit to study the particles and fields near the Sun. Subsequent proposals in the 1970s and 1980s laid the groundwork, though it would take several decades to realize the technological advancements and cost-effective mission necessary for its execution.

In its previous close passes, the Parker Solar Probe has uncovered numerous intriguing and unanticipated findings. During its [initial foray into the solar atmosphere in 2021](#), the probe revealed that the corona's outer boundary was distinguished by spikes and valleys, challenging prior assumptions. Furthermore, it identified the source of switchbacks—zigzag structures—in the solar wind within the photosphere. The probe has since spent significantly more time in the corona, meticulously examining pivotal solar processes.

A graphic about the probe

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NASA's Parker Solar Probe successfully navigated its record-setting closest approach to the solar surface on December 24, 2024. (NASA)

The probe's discoveries transcend solar phenomena. A primary objective includes examining how solar activity impacts "space weather," which encompasses the interactions between solar wind and Solar System planets. Notably, the probe has captured [numerous images of Venus](#) throughout its gravity assists, documenting the planet's radio emissions and providing the inaugural complete image of Venus' orbital dust ring.

Additionally, the probe has faced [coronal mass ejections](#) (CMEs) numerous times, which have swept dust along their paths within the Solar System. "We now comprehend the solar wind and its acceleration away from the Sun," commented Adam Szabo, the Parker Solar Probe mission scientist at NASA's Goddard Space Flight Center. "This close encounter will yield further data to deepen our understanding of how it accelerates as it approaches the Sun."



The probe also provided a [unique viewpoint of comet NEOWISE](#) by capturing images from its exceptional vantage point. With confirmation of the probe's safety, the mission team eagerly anticipates its data transmission from the recent solar pass.

"The data to be retrieved from the spacecraft will provide unprecedented information about a location humanity has never reached," stated Joe Westlake, the director of the Heliophysics Division at NASA Headquarters. "This is an astounding achievement."

The spacecraft is scheduled for its next solar encounters on March 22, 2025, and June 19, 2025.

This article was originally published by [Universe Today](#). Read the [original article](#).

Vocabulary List:

1. **Trajectory** /trə'dʒɛktəri/ (noun): The path followed by an object moving through space.
2. **Maneuvers** /mə'nu:vərz/ (noun): Planned movements or actions to achieve a specific goal.
3. **Proximity** /prɒk'sɪmɪti/ (noun): Nearness in space time or relationship.
4. **Extravagant** /ɪk'strævəgənt/ (adjective): Lacking restraint in spending money or using resources.
5. **Phenomenal** /fə'nɒmɪnəl/ (adjective): Remarkable or exceptional; extraordinary.
6. **Endurance** /ɪn'dʒʊərəns/ (noun): The ability to endure an unpleasant or difficult process or situation without giving way.

Comprehension Questions

Multiple Choice

1. When did NASA's Parker Solar Probe become the nearest object to the Sun?

Option: August 2018

Option: October 29, 2018

Option: December 24, 2024

Option: November 6, 2024

2. What speed did the Parker Solar Probe reach while traversing the solar atmosphere?

Option: 400,000 kilometers per hour

Option: 692,000 kilometers per hour

Option: 1 million kilometers per hour



Option: 850,000 kilometers per hour

3. What material does the Parker Probe use for its shield to withstand extreme temperatures?

- Option: Aluminum
- Option: Steel
- Option: Carbon foam
- Option: Titanium

4. Who is the project scientist for the Parker Solar Probe at the Johns Hopkins Applied Physics Laboratory (JHUAPL)?

- Option: Nicky Fox
- Option: Joe Westlake
- Option: Ratan Naval Tata
- Option: Nour Rawafi

5. What did the Parker Solar Probe reveal about the corona's outer boundary during its initial foray into the solar atmosphere in 2021?

- Option: It is smooth and uniform
- Option: It is filled with clouds
- Option: It is distinguished by spikes and valleys
- Option: It is hotter than expected

6. What is one of the primary objectives of the Parker Solar Probe according to the article?

- Option: Explore asteroid belts
- Option: Study Saturn's rings
- Option: Examine how solar activity impacts "space weather"
- Option: Investigate black holes

True-False

7. The Parker Solar Probe is the fastest man-made object to date.

8. The Parker Solar Probe first emerged as a concept in a 1986 report.

9. The spacecraft reached an optimal orbit on November 6, 2024, enabling it to study solar processes and space weather.

10. The Parker Solar Probe provided a unique viewpoint of asteroid NEOWISE.



11. The Parker Probe has not faced any coronal mass ejections (CMEs) during its missions.
12. Nicky Fox is the director of the Heliophysics Division at NASA Headquarters.

Answer

Multiple Choice: 1. October 29, 2018 2. 692,000 kilometers per hour 3. Carbon foam 4. Nour Rawafi
5. It is distinguished by spikes and valleys 6. Examine how solar activity impacts "space weather"
True-False: 7. True 8. False 9. True 10. False 11. False 12. False

Vocabulary quizzes

Multiple Choice (Select the Correct answer for each question.)

1. Which term refers to the process of water falling to the ground from the atmosphere?
Option: Phenomena
Option: Anticipate
Option: Exploit
Option: Precipitation
2. What does the term "proximity" mean?
Option: Trajectory
Option: Pervasive
Option: Proximity
Option: Extravagant
3. Which term describes the ability to withstand prolonged stress or activity?
Option: Manifest
Option: Endurance
Option: Severity
Option: Propensity
4. Which term relates to mental processes such as thinking learning and remembering?
Option: Cognitive
Option: Plethora
Option: Acuity
Option: Interconnectedness
5. What is the enzyme responsible for maintaining the length of telomeres?
Option: Advocate



- Option: Telomerase
- Option: Self-healing
- Option: Durability

6. Which term refers to the feeling of tiredness or exhaustion?

- Option: Phenomenon
- Option: Fatigue
- Option: Microscopic
- Option: Exploit

7. What does the term "severity" imply?

- Option: Severity
- Option: Anticipate
- Option: Trajectory
- Option: Proactive

8. To alleviate means to:

- Option: Alleviate
- Option: Advocate
- Option: Extravagant
- Option: Endurance

9. What does the term "propensity" refer to?

- Option: Manifest
- Option: Propensity
- Option: Pervasive
- Option: Proximity

10. Which term means to display or show clearly?

- Option: Cognitive
- Option: Manifest
- Option: Interconnectedness
- Option: Endurance

Gap-Fill (Fill in the blanks with the correct word from the vocabulary list.)

11. This year has seen a _____ increase in online shopping due to the pandemic.
12. The theory of _____ suggests that everything is connected in some way.
13. She threw an _____ birthday party with fireworks and live music.
14. It is better to be _____ in preventing problems rather than dealing with them after



they occur.

15. The buffet offered a _____ of options from salads to desserts.
16. Taking a pain reliever can help _____ headache symptoms.
17. The storm caused _____ damage to buildings and vehicles.
18. The organization works to _____ for animal rights and welfare.
19. Marathon runners need great _____ to complete a 26.2-mile race.
20. _____ is an enzyme that adds DNA sequence repeats to the ends of chromosomes.

Matching Sentences (Match each definition to the correct word from the vocabulary list.)

21. occur when one celestial body passes in front of another obscuring it from view.
22. Pilots need to perform quick and precise when flying in challenging conditions.
23. Being able to potential issues can help in avoiding last-minute problems.
24. The influence of social media is in modern society affecting people of all ages.
25. Certain materials have the ability to undergo processes to repair cracks and damage.
26. Products that are known for their are more likely to last longer and withstand wear and tear.
27. A solar eclipse is a natural that captivates people around the world.
28. organisms play a crucial role in various ecosystems despite their small size.
29. The of a rocket determines its path through space and back to Earth.
30. Some companies may try to legal loopholes for their benefit which can lead to ethical issues.

Answer

Multiple Choice: 1. Precipitation 2. Proximity 3. Endurance 4. Cognitive 5. Telomerase 6. Fatigue 7. Severity 8. Alleviate 9. Propensity 10. Manifest

Gap-Fill: 11. Phenomenal 12. Interconnectedness 13. Extravagant 14. Proactive 15. Plethora 16. Alleviate 17. Severe



18. Advocate 19. Endurance 20. Telomerase

Matching sentence: 1. Occultations 2. Maneuvers 3. Anticipate 4. Pervasive 5. Self-healing 6. Durability
7. Phenomenon 8. Microscopic 9. Trajectory 10. Exploit

CATEGORY

1. Sci/Tech - LEVEL5

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