

VENUS IN FOCUS

Relevant for: Geography | Topic: The Earth and the Solar System

Venus, the hottest planet in the solar system, has not enjoyed as much recent attention as Mars, as far as space missions are concerned. With surface temperatures of above 460° Celsius that can melt even a metal like lead, and a heavy atmosphere of carbon dioxide, the planet was considered hostile to life. This despite its being similar in size to the Earth and rocky, so much so that it is often called the Earth's "sister planet". There was some excitement when the European Space Agency's mission, Venus Express, found signs of ozone, made of three oxygen atoms and considered a biomarker, in the upper atmosphere of Venus, in 2011. But the recent [discovery of traces of phosphine](#), another biomarker, in its atmosphere has just given the search for extraterrestrial life a shot in the arm. Phosphine, a compound of one phosphorous atom and three hydrogen atoms, is given out by some microbes during biochemical processes. In an atmosphere rich in carbon dioxide, it is likely to get destroyed soon. However, the researchers estimate that phosphine forms about 20 parts per billion of Venus's atmosphere. This fact, when added to the hostile conditions on its surface, yields tantalising possibilities — of phosphine's survival through extraordinary chemistry and thermodynamics or the stubborn triumph of biology and life.

This finding was the result of years of careful study by a team of international astronomers led by Jane S. Greaves of Cardiff University and was announced in a paper published in *Nature Astronomy*. Prof. Greaves first identified phosphine in Venus's atmosphere in 2017, using the James Clerk Maxwell Telescope in Hawaii. Further study and precise observations using the Atacama Large Millimeter/sub-millimeter Array facility in Chile confirmed the suspicions of the researchers in 2019. The very caution exercised by the researchers in announcing the fact underlines the lack of knowledge about these systems and the need to make sure before celebrating the discovery of extraterrestrial life. This can now only be taken further by making *in situ* measurements in the atmosphere of Venus. This poses its own challenges. Apart from the high surface temperature and dense atmosphere, the presence of sulphuric acid in the atmosphere of Venus makes it a highly corrosive environment. Perhaps flying at a height and sending down drones or balloons would be more feasible than a landing. Missions to Venus have been planned by NASA and ISRO. While NASA's mission is slated for launch next year, ISRO is looking at 2023 right now. As is not uncommon in space missions, a spate of collaborations may well improve chances of efficiently probing the dense atmosphere of the planetary neighbour.

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