MISSION PSYCHE

SPACE EXPLORATION'S FIRST MISSION TO A METAL WORLD

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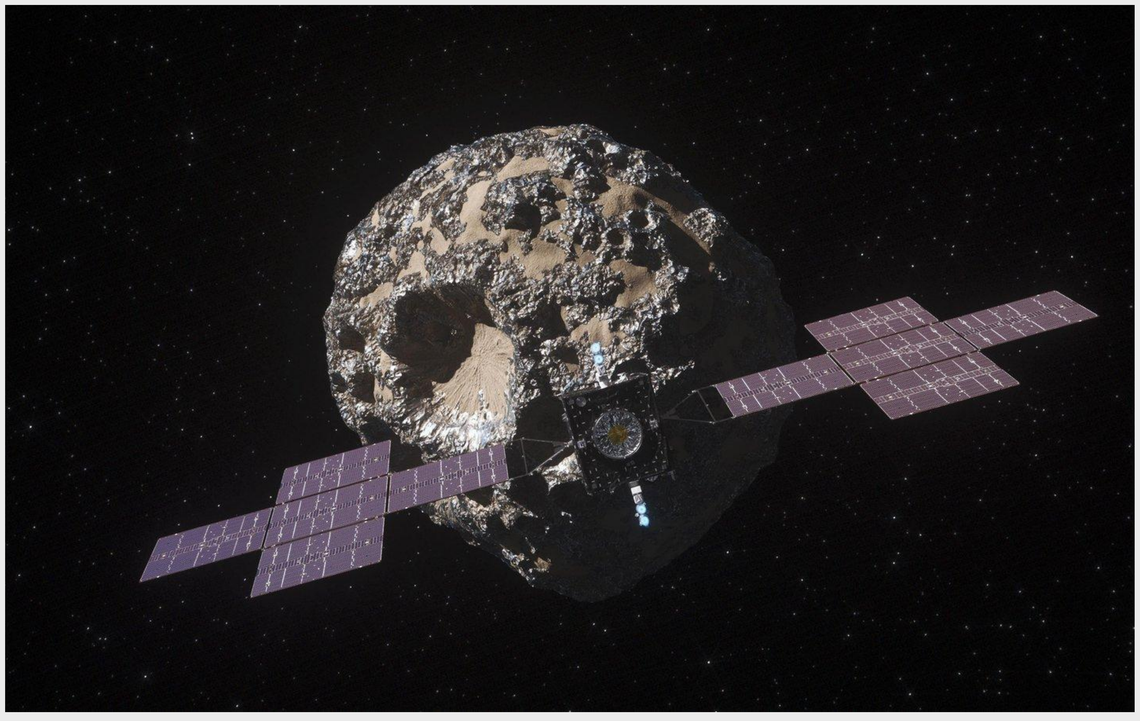

ROBOTIC EXPLORATION: A REMOTE SENSOR APPROACH

- Psyches surface presents a problem: how does one traverse a previously unknown environment?
- Hazards such as metallic sand, low-friction surfaces, and sharp terrain make traditional rovers risky at best
- Our Solution: bypass traversal by deploying remote sensor packages across a wide area
- Sensor packages are launched from a stationary lander in a pattern spreading up to a kilometer from the initial landing site.
- These packages collect a variety of acoustic, radiometric, and visual data, and transmit back to the lander and the orbiter
- This way we can achieve a wide sensing area without worrying about a robotic explorer needing to traverse an unknown and potentially hostile environment

Oregon State University

PSYCHE-16: THE ASTEROID

Psyche-16 is a 140-mile-wide, metal-rich asteroid orbiting the Sun between Mars and Jupiter. It is suspected to be the iron core of an early planetesimal with an estimated 30-60% metal composition - prompting NASA's mission to explore the asteroid's surface.

Previous missions have relied on robotic explorers such as the series of Mars and lunar rovers. Psyche-16's surface poses a unique challenge as the asteroid has no atmosphere, unknown surface terrain, and a microgravity less than 1% that of Earth's.

PSYCHE MISSION OBJECTIVES

- Understand a previously unexplored building block of planet formation: iron cores.
- Look inside terrestrial planets, including Earth, by directly examining the interior of a differentiated body, which otherwise could not be seen.
- Explore a new type of world. For the first time, examine a world made not of rock and ice, but metal.
- Determine whether Psyche is an exposed core, or if it is unmelted material.
- Determine the relative ages of regions of Psyche's surface.

REMOTE SENSING SYSTEM: RESULTS AND RECOMMENDATIONS

- Simulations show remote sensors will land within 7 meters of the intended landing site
- Current launch system proposal is a spring catapault guided by a set of four rails
- In Earth gravity this system was expected to achieve an accuracy of about [PLACEHOLDER] meters
- Testing in Earth conditions resulted in an average accuracy of [PLACEHOLDER] meters
- The concept seems to be viable
- The team recommends that the design be further refined for attachment to a stationary probe or some other form of rover.