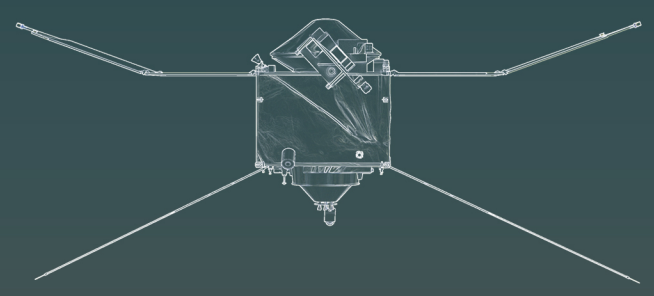
MAVEN: A decade of deciphering Mars' atmospheric evolution

On September 21, 2014, NASA's MAVEN (Mars Atmosphere and Volatile EvolutioN) spacecraft entered orbit around Mars, beginning its ongoing exploration of the Red Planet's upper atmosphere. The mission has produced a wealth of data about how Mars' atmosphere responds to the Sun and solar wind, and how these interactions can explain the loss of the Martian atmosphere to space.

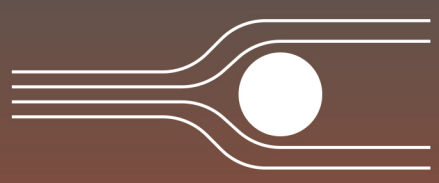
Today, MAVEN continues to make exciting new discoveries about the Red Planet that increase our understanding of how atmospheric evolution affected Mars' climate and the previous presence of liquid water on its surface, potentially determining its prior habitability.

STATISTICS

- Orbits completed: 22,000+
- Electrons detected: 14 trillion+
- Ultraviolet images of Mars taken: 10,000+
- Data relays performed: 1,850+ relays with M2020, MSL, and Insight
- Most data sent in a single relay: 2.89 Gb, a Solar System record!
- Scientific papers published: 700+



SCIENCE HIGHLIGHTS



Extreme atmospheric erosion: One of MAVEN's first big discoveries was how the solar wind—a stream of charged particles continually flowing from the Sun—and solar storms continually strip away Mars' atmosphere, which played a key role in altering the planet's habitability.

A new type of aurora: MAVEN has discovered several types of auroras that flare up when energetic particles plunge into the atmosphere, bombarding gases and making them glow. MAVEN showed that protons, rather than electrons, create auroras at Mars.

Martian dust storm: In 2018, MAVEN studied the impact of a planet-wide dust storm on Mars' upper atmosphere, finding that such storms lift water molecules higher than usual, leading to a sudden surge in water loss to space.

Mapping electric currents and twisted tails: MAVEN mapped electric and magnetic fields for the first time, revealing a complex current system and a twisted magnetotail that play a fundamental role in Mars' atmospheric loss.

For more information about the mission, go to: https://science.nasa.gov/mission/maven/

Credits: NASA/JPL-Caltech