

# NASA launches robotic explorer to Mars

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The United Launch Alliance Atlas V rocket with NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft onboard is seen at the Cape Canaveral Air Force Station Space Launch Complex 41, Sunday, Nov. 17, 2013, Cape Canaveral, Fla. The robotic explorer called Maven is due to blast off Monday, Nov. 18, 2013 on a 10-month journey to the red planet. There, it will orbit Mars and study the atmosphere to try to understand how the planet morphed from warm and wet to cold and dry. (AP Photo/NASA, Bill Ingalls)

NASA's newest robotic explorer, Maven, rocketed toward Mars on Monday on a quest to unravel the ancient mystery of the red planet's

radical climate change.

The Maven spacecraft is due at Mars next fall following a journey of more than 440 million miles (700 million kilometers).

Scientists want to know why Mars went from being warm and wet during its first billion year to cold and dry today. The early Martian atmosphere was thick enough to hold water and possibly support microbial life. But much of that atmosphere may have been lost to space, eroded by the sun.

Maven set off through a cloudy sky Monday afternoon in its effort to provide answers. An unmanned Atlas V rocket put the spacecraft on the proper course for Mars, and launch controllers applauded and shook hands over the success.

An estimated 10,000 NASA guests gathered for the launch, the most exciting one of the year from Cape Canaveral. The University of Colorado at Boulder, which is leading the Maven effort, was represented by a couple thousand people.

"We're just excited right now and hoping for the best," said the university's Bruce Jakosky, principal scientist for Maven.

To help solve this environmental puzzle at the neighboring planet, Maven will spend an entire Earth year measuring atmospheric gases once it reaches Mars on Sept. 22, 2014.

This is NASA's 21st mission to Mars since the 1960s. But it's the first one devoted to studying the Martian upper atmosphere.

The mission costs \$671 million.

Maven—short for Mars Atmosphere and Volatile Evolution, with a

capital "N" in EvolutioN—bears eight science instruments. The spacecraft, at 5,410 pounds (2,450 kilograms), weighs as much as an SUV. From solar wingtip to wingtip, it stretches 37.5 feet (11.4 meters), about the length of a school bus.



This photo provided by NASA shows a full moon rising behind the United Launch Alliance Atlas V rocket with NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft onboard at the Cape Canaveral Air Force Station Space Launch Complex 41, Sunday, Nov. 17, 2013, Cape Canaveral, Florida. NASA's next Mars-bound spacecraft, the Mars Atmosphere and Volatile Evolution, or MAVEN, is the first spacecraft devoted to exploring and

understanding the Martian upper atmosphere. (AP Photo/NASA, Bill Ingalls)

A question underlying all of NASA's Mars missions to date is whether life could have started on what now seems to be a barren world.

"We don't have that answer yet, and that's all part of our quest for trying to answer, 'Are we alone in the universe?' in a much broader sense," said John Grunsfeld, NASA's science mission director.

Unlike the 2011-launched Curiosity rover, Maven will conduct its experiments from orbit around Mars.

Maven will dip as low as 78 miles (125 kilometers) above the Martian surface, sampling the atmosphere. The lopsided orbit will stretch as high as 3,864 miles (6,218 kilometers).

Curiosity's odometer reads 2.6 miles (4.2 kilometers) after more than a year of roving the red planet. An astronaut could accomplish that distance in about a day on the Martian surface, Grunsfeld noted.

Grunsfeld, a former astronaut, said considerable technology is needed, however, before humans can fly to Mars in the 2030s, NASA's ultimate objective.

Mars remains an intimidating target even for robotic craft, more than 50 years after the world's first shot at the [red planet](#).

Fourteen of NASA's previous 20 missions to Mars have succeeded, beginning with the 1964-launched Mariner 4, a Martian flyby. The U.S. hasn't logged a Mars failure, in fact, since the late 1990s.

That's a U.S. success rate of 70 percent. No other country comes close. Russia has a poor track record involving Mars, despite repeated attempts dating to 1960.

India became the newest entry to the Martian market two weeks ago with its first launch to Mars.

If all goes well, Maven will cruise past India's Mars voyager, called Mangalyaan, or "Mars craft" in Hindi. Maven should beat Mangalyaan to Mars by two days next September, said NASA project manager David Mitchell.

"It's kind of a neat race, and we wish them all the best," Mitchell said.

Earth and Mars line up properly for a Mars flight every two years, occasionally resulting in just this sort of traffic jam. The two planets are constantly on the move, thus the 440 million-mile-plus chase by Maven to Mars over the next 10 months.

Maven's science instruments will be turned on in the next few weeks. The University of Colorado's ultraviolet spectrograph will try to observe Comet ISON, now visible and brightening in the night sky as it speeds toward the sun.

ISON will zip within 730,000 miles (1,174,766.66 kilometers) of the sun on Thanksgiving Day. Astronomers are uncertain whether the comet will survive that blisteringly close encounter.

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