

NASA's newest Mars flyer will explore atmosphere

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In this Friday, Sept. 27, 2013 file photo, technicians work on NASA's next Mars-bound spacecraft, the Mars Atmosphere and Volatile Evolution (MAVEN), at the Kennedy Space Center in Cape Canaveral, Fla. The robotic explorer is scheduled to blast off Monday, Nov. 18, 2013 on a 10-month journey to the red planet to study the atmosphere in an attempt to understand how Mars changed from warm and wet to cold and dry. (AP Photo/John Raoux)

(AP)—NASA hopes its newest Mars spacecraft lives up to its know-it-all name.

The robotic explorer called Maven is due to blast off Monday 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.

"A [maven](#) is a trusted expert," noted NASA's space science chief, John Grunsfeld. Maven will help scientists "build a story of the Mars atmosphere and help future human explorers who journey to Mars."

The \$671 million mission is NASA's 21st crack at Earth's most enticing neighbor, coming on the heels of the Curiosity rover, still rolling strong a year after its grand Martian arrival.

When Maven reaches Mars next September, it will join three functioning spacecraft, two U.S. and one European. An Indian orbiter also will be arriving about the same time. Maven will be the 10th orbiter to be launched to Mars by NASA; three have failed, testimony to the difficulty of the task.

"No other planet, other than perhaps Earth, has held the attention of people around the world than Mars," Grunsfeld said.

Early Mars had an atmosphere thick enough to hold water and moist clouds, said chief investigator Bruce Jakosky of the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder. Indeed, water flowed once upon a time on Mars, and microbial life might have existed.

"But somehow that atmosphere changed over time to the cold, dry environment that we see today," Jakosky said. "What we don't know is what the driver of that change has been."

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

capital N in EvolutionN —is the first spacecraft devoted entirely to studying Mars' upper atmosphere. India's orbiter will also study the atmosphere but go a step further, seeking out methane, a possible indicator of life.

Scientists theorize that some of the early atmospheric water and carbon dioxide went down into the crust of the Martian surface—there is evidence of carbonate minerals on Mars. Gases also may have gone up and become lost to space, stripped away by the sun, molecule by molecule, Jakosky said.

Maven holds eight scientific instruments to measure the upper atmosphere for an entire Earth year—half a Martian year. The boxy, solar-winged craft—as long as a school bus and as hefty as a 5,400-pound (2,450-kilogram) sport utility vehicle—will dip as low as 78 miles (125 kilometers) above the surface for atmospheric sampling, and its orbit will stretch as high as 3,864 miles (6,218 kilometers).

Understanding the makeup and dynamics of Mars' present atmosphere will help guide humans more safely to the planet's surface, especially if the ship takes advantage of the atmosphere for braking, Jakosky said. NASA targets the 2030s for the first manned expedition.

The spacecraft also holds an antenna and radio to serve as a communications relay for NASA's two active Martian rovers, Curiosity and Opportunity, as well as the next pair of landers to be launched in 2016 and 2020.

Maven is considered so important that launch preparations were allowed to resume a couple of days after the start of the 16-day government shutdown. Maven has one month to launch; Earth and Mars line up just so, just every 26 months. So if Maven isn't flying by mid to late December, the spacecraft will be grounded until the beginning of 2016.

The red planet is a notoriously tricky target. The world's overall success rate since the 1960s for a Mars mission is less than 50-50.

NASA has attempted the most, 20 launches so far, and has the best success rate: 70 percent. Russia, in second place with 18 Mars launches, has a dismal 14 percent success rate. China collaborated on one of the Russian flops. Europe and Japan have attempted one Martian mission apiece; the European Mars Express has had mixed results, while the Japanese effort fizzled.

"We're never a success until we're at Mars and we're taking data and getting the science that these folks envisioned back in 2003," when the idea arose, observed NASA project manager David Mitchell.

There's a light side to Maven.

Attached to one of Maven's solar wings is a DVD containing more than 100,000 names submitted by the public earlier this year, as well as more than 1,000 Japanese-style haiku verses, also penned by the public, and 377 student art contest entries.

The Maven team liked this haiku from an anonymous contributor:

"Amidst sand and stars/We scan a lifeless planet/To escape its fate."

But this haiku was the No. 1 public vote-getter, submitted by British blogger Benedict Smith:

"It's funny, they named/Mars after the God of War/Have a look at Earth."

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