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### NASA orbiter to hunt for source of Martian methane

15:46 05 March 2009 by [Rachel Courtland](#)  
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NASA is setting its sights on launching an orbiter in 2016 that could map methane on Mars and help settle whether the gas has a biological or geological origin.

The orbiter will fly on its own or with the European Space Agency's [ExoMars](#) rover, according to plans presented on Tuesday in Washington, DC, at a meeting of the [Mars Exploration Program Analysis Group](#).

The agency originally aimed to launch a lander or rover in 2016, but the plans will be dropped in order to pay for a [two-year delay](#) in the launch of the hulking Mars Science Laboratory rover that will cost NASA an estimated \$400 million. The one-tonne nuclear-powered rover has unresolved technical issues that pushed its launch to 2011 from 2009.

"The majority of the way we're paying for that [delay] is funding that was going to be used for the 2016 mission," says Doug McCuistion, NASA's director for Mars exploration.

As a result, NASA will launch the orbiter in 2016 to help boost telecommunications around the planet as existing orbiters age. A rover or lander may follow in 2018, as a next step in the path to one day [returning samples of Martian rocks and soil to Earth](#).

The exact payload and budget of the 2016 probe are not yet set. But at Tuesday's meeting, a team of researchers presented a vision of the probe's basic payload that could clear up the picture of how methane on Mars is distributed and where it comes from.

#### Methane hotspots

Ground-based observations of the Red Planet led by [Michael Mumma](#) of NASA's Goddard Space Flight Center suggest methane on Mars actually [stems from a few hotspots](#) that could be linked to underground pockets of gas created by the interaction of water with volcanic rock, or perhaps, by methane-producing microbes.

But some remain [unconvinced](#) of the hotspot result, arguing that the gas should be evenly spread since it moves quickly and seems to have a long lifetime in the atmosphere.

The 2016 orbiter could help determine whether there are indeed methane hotspots. One idea is to use a spectrometer to look through the Martian

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A NASA orbiter set to launch towards Mars in 2016 will focus on measuring trace atmospheric gases like methane, which might have a biological source. This region of Mars, called Nili Fossae, appears to be a 'hotspot' for the gas (Image: NASA/JPL-Caltech/U of Arizona)

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atmosphere when the Sun passes behind the planet - an event called a 'solar occultation'.

By measuring how much sunlight is absorbed by the atmosphere during the occultations, the spectrometer could detect the concentration of gases in the atmosphere to a sensitivity of several parts per trillion.

**High accuracy**

"It has more than enough accuracy to test Mumma's report," says Jim Kasting of Pennsylvania State University in University Park, and a member of the 2016 probe's Science Definition Team.

"You will also get better spatial and temporal accuracy" of the distribution of methane over the planet, Kasting told **New Scientist**.

"None of the orbiters that are in orbit now or anything that we've done in the past were optimised for making these [high-precision] measurements," says [Sushil Atreya](#) of the University of Michigan. Atreya is a member of Europe's Mars Express orbiter mission, which found some of the [first hints of methane](#) in the planet's atmosphere in 2004.

But "methane maps alone won't be able to answer the question of the source of the methane," Atreya says. The case for a biological origin for the gas would be strengthened if there is an overabundance of methane laden with the isotope carbon-12, which life prefers to process over heavier isotopes.

**Tracking the source**

If, however, the atmosphere also contains heavier hydrocarbons such as ethane, which life as we know it cannot produce, that would point to a geological source for the methane.

The 2016 orbiter's science goals include plans to measure several isotope concentrations as well as heavier hydrocarbons and could therefore lend insight into what is pumping out the gas.

Scientists working on plans for the orbiter have been asked to work with a budget of \$700 million. For comparison, the agency's next Mars orbiter, [MAVEN](#), set to launch in 2013 to study how gas is lost from Mars's atmosphere, will cost \$485 million.

Ultimately, settling on the design of the orbiter may require negotiation with ESA. The agencies are contemplating sharing a launch vehicle, which could mean both NASA's orbiter and ESA's rover will have to trim down to meet weight and budget requirements, McCuiston says. A design review of ExoMars is set for later this month.

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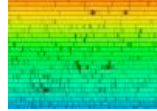
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