

## Nasa discovers hint of life on Mars: as it happened

Is there life on Mars? Nasa thinks there might be, after its Curiosity Rover discovered spikes of methane, a gas usually produced by living organisms

By Sarah Knapton, Science Editor

6:30PM GMT 16 Dec 2014

- Life on Mars: Nasa finds first hint of alien life
- **Mars Rover finds methane, indicating presence of bacteria**
- Nasa staging press conference at 6.30pm GMT
- Life on Mars: what has Nasa found?
- **Tweet your pictures and comments to @Sarahknapton**

### *Latest*

**9.35pm** We're going to leave it there for the night. Please check our newswrap for a full rundown of today's developments.

**9.15pm** The Huffington Post went full ray gun in excitement at today's announcement.

**8.45pm** Vox has written about the significance of the discovery of organic molecules on Mars's surface and the unusual ebbs and flows of methane.

*Neither of these findings mean anything definitive about whether Mars was once home to life. But along with other recent discoveries — such as evidence of an ancient lakebed announced just last week — they're positive signs that further suggest the planet may have once been habitable billions of years ago.*

**8.15** Curiosity has a Twitter alter-ego called Sarcastic Rover, who is rarely impressed by anything happening in the galaxy. But today even Sarcastic Rover is striking a reverential note.

**7.35pm**



Researchers also reported that Curiosity's sampling of Martian water, bound into lakebed minerals in the Cumberland rock more than three billion years ago, indicates the planet lost much of its water before that lakebed formed and continued to lose large amounts after.

“ It's really interesting that our measurements from Curiosity of gases extracted from ancient rocks can tell us about

Rover Detects Critical 'Spikes' In Methane Gas - A key Organic Sign Of Life.. NASA: 'Discovery Could Point To Existence Of Life On Red Planet'.. Readings Could Originate From Microbial Bugs Known As Methanogens

loss of water from Mars

**Dr Paul Mahaffy**, of NASA's Goddard Space Flight Center in Greenbelt, Maryland

**7.30pm**

Curiosity's findings from analyzing samples of atmosphere and rock powder do not reveal whether Mars has ever harbored living microbes, but the findings do show that Mars is chemically active and could harbour life.

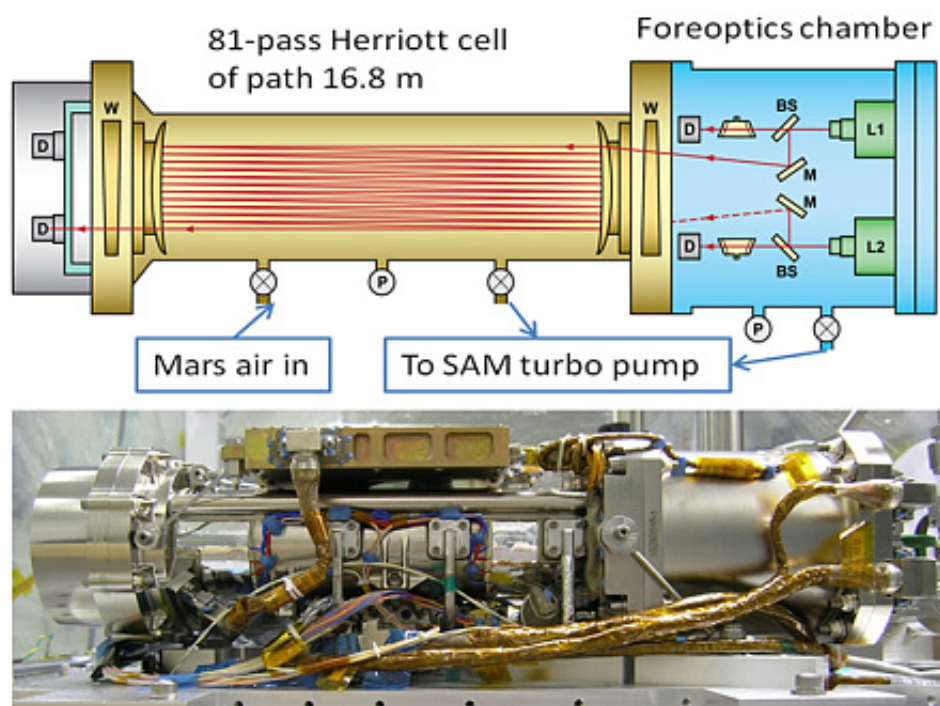
“ *We will keep working on the puzzles these findings present. Can we learn more about the active chemistry causing such fluctuations in the amount of methane in the atmosphere? Can we choose rock targets where identifiable organics have been preserved?*

**Dr John Grotzinger** Curiosity project scientist of the California Institute of Technology in Pasadena

**7.25pm** The instrument which detected the methane on Mars is a Tunable Laser Spectrometer (TLS) which is part of the Curiosity Rover.

By measuring absorption of light at specific wavelengths, TLS measures concentrations of methane, carbon dioxide and water vapor in the Martian atmosphere. It includes a chamber called a Herriott cell, where a laser beam at a precisely tuned wavelength is reflected between mirrors to bounce

back and forth through the sample of gas being analyzed.



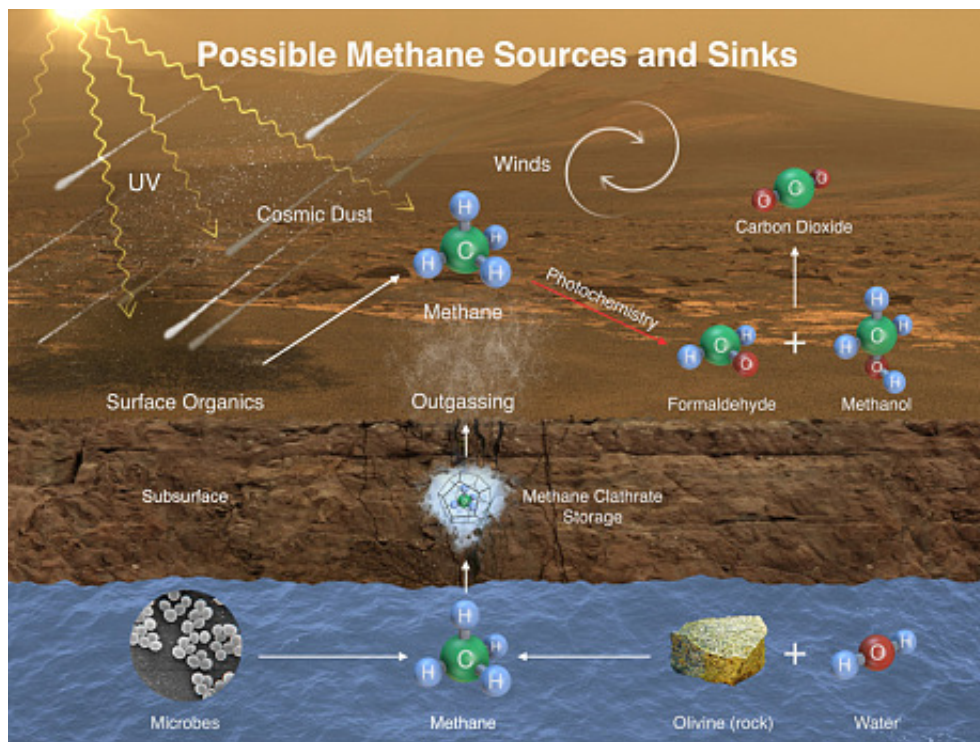
## 7.20pm

Nasa has produced a graphic showing how methane might end up in Mars atmosphere or in the ground. A molecule of methane consists of one atom of carbon and four atoms of hydrogen. Methane can be generated by microbes and can also be generated by processes that do not require life, such as reactions between water and olivine (or pyroxene) rock.

Ultraviolet radiation (UV) can induce reactions that generate methane from other organic chemicals produced by either biological or non-biological processes, such as comet dust falling on Mars.

Methane generated underground in the distant or recent past might be stored within lattice-structured cells called clathrates, and released at a later time, so that methane being released to the atmosphere today might have formed in the past.

Winds on Mars can also quickly distribute methane coming from any individual source, reducing the concentration of methane.



**7.15pm**

New images released by Nasa shows drilling holes made by Curiosity on the surface of Mars. Organic compounds were found in the soil. Curiosity drilled into this rock target.



**7.15pm**

Researchers used Curiosity's onboard Sample Analysis at Mars (SAM) laboratory a dozen times in a 20-month period to sniff methane in the atmosphere. During two of those months, in late 2013 and early 2014, four measurements averaged seven parts per billion. Before and after that, readings averaged only one-tenth that level.

Curiosity also detected methane in powder drilled from a rock dubbed Cumberland, the first definitive detection of organics in surface materials of Mars. These Martian organics could either have formed on Mars or been delivered to Mars by meteorites.

## 7.10pm

“ *This temporary increase in methane -- sharply up and then back down -- tells us there must be some relatively localized source.*

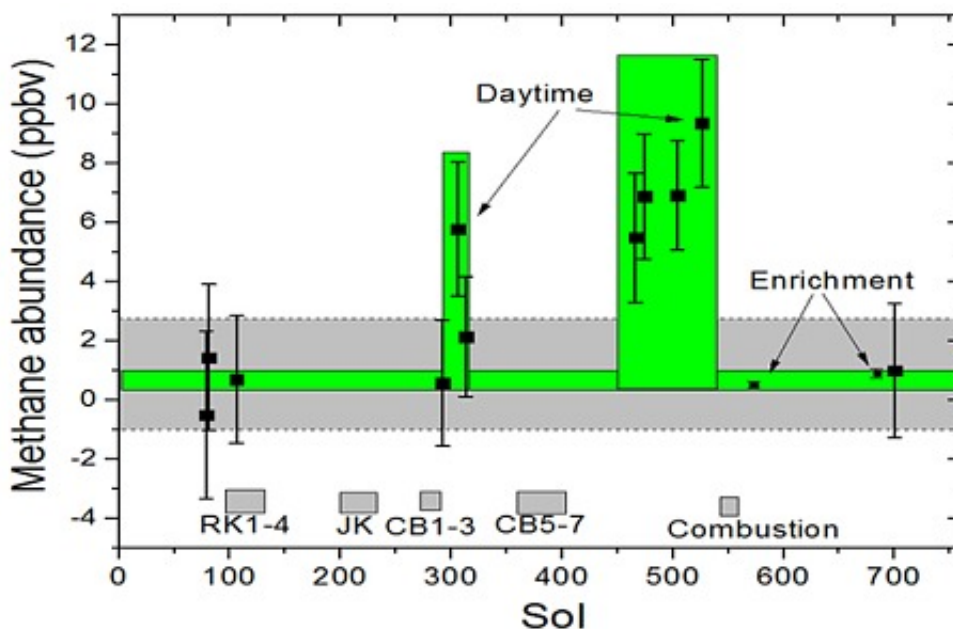
*There are many possible sources, biological or non-biological, such as interaction of water and rock.*

**Sushil Atreya** of the University of Michigan, Ann Arbor, a member of the Curiosity rover science team.

## 7.06pm

## 7.05pm

A graph showing the rise of methane levels on Mars.



## *The methane spike Mars*

**7pm**

“ *Strictly speaking, our observations are evidence for methane production on Mars, and in themselves cannot directly provide evidence of microbial life.*

*However, from our positive detection of methane on Mars, we cannot rule out the possibility that both the low background level and the high methane values originate in part from microbial activity (methanogenesis).*

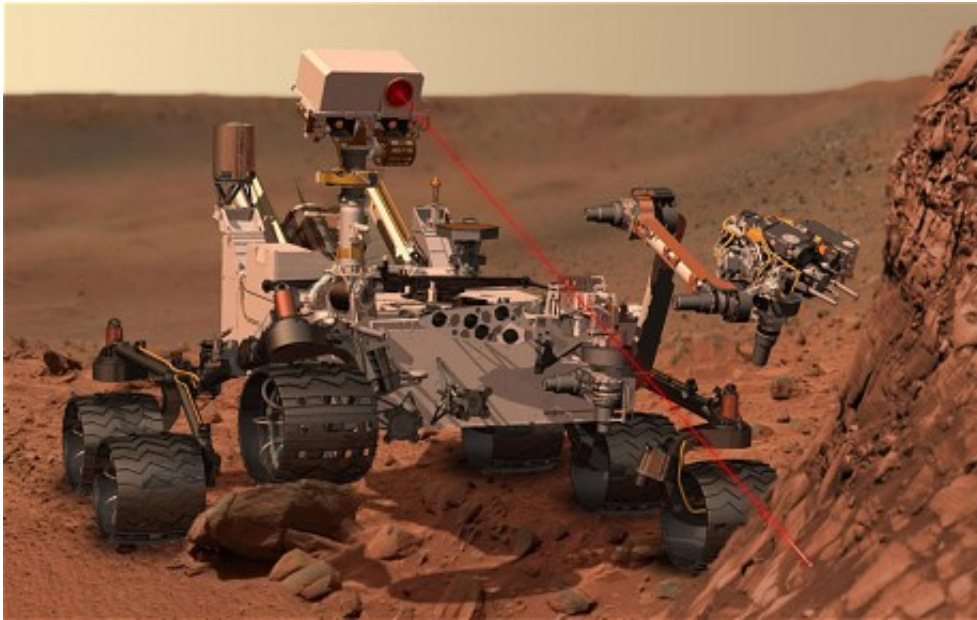
*Our observations indicate that either the source shut off or the wind field at the source location changed to direct the emission away from us.*

*At this time, we have no idea what we will see in the future, or if we will ever see high values again.*

**Dr Chris Webster** of Nasa talks about the discovery

**6.55pm**

The methane readings were taken by the Curiosity rover which has been on Mars since 2012.



**6.50pm**

Curiosity has been exploring Mars' Gale Crater, a 96 mile wide depression caused by an asteroid strike, since 2012.

Previous satellite observations have detected unusual plumes of methane on the planet, but none as extraordinary as the sudden

"venting" measured at the crater.

The new discovery, reported in the journal *Science*, came from gas samples by Curiosity's Tunable Laser Spectrometer (TAS), an instrument that uses intense light to carry out chemical analysis.

The low background level of methane can be explained by the Sun's rays degrading organic material possibly deposited by meteors, said the Nasa scientists

But the readings in a 300 metre squared area spiked 10-fold over a period of just 60 Martian days.

### 6.45pm

Read about the full discovery here. Earlier I spoke to Dr Paul Mahaffy at Nasa.

“ *What is interesting is that these spikes of methane are coming and going. They are transient. At the moment we can't really tell anything, but these burps are intriguing. We have to keep an open mind.*

### 6.40pm

Methane can be generated by biology or geology. Rocks containing minerals which are common on Mars would interact with water and produce methane. Microbes also produce methane in their metabolic process.

### 6.35pm

Nasa is holding its press conference announcing the methane discovery.

“ *It's not an argument that we have found evidence of life on Mars, but it's one of the hypotheses that we must consider as we go forward into the future. This is really exciting news for us.*”

### Nasa spokesman

### 6.30pm

Since William Herschel spotted polar ice caps on Mars in the mid 17th century, astronomers have speculated that life could exist on a planet which seemed so similar to Earth.

But when probes began to beam back images of a barren wasteland in the 1960s and Viking 1 failed to find organic chemicals in 1976, hopes faded.

Now, however Nasa believes it has found the first hint that life could exist on The Red Planet.

Intriguing ‘burps’ of methane has have been recorded by the Curiosity Rover which may have been produced by bacteria. Most methane on Earth is produced as a waste gas by living organisms.

Curiosity has previously found water bound in the fine soil of Mars, believed to be crucial to life. But if the existence of living, breathing microbes is confirmed, it will be the first evidence of life outside Earth.

How we moderate

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