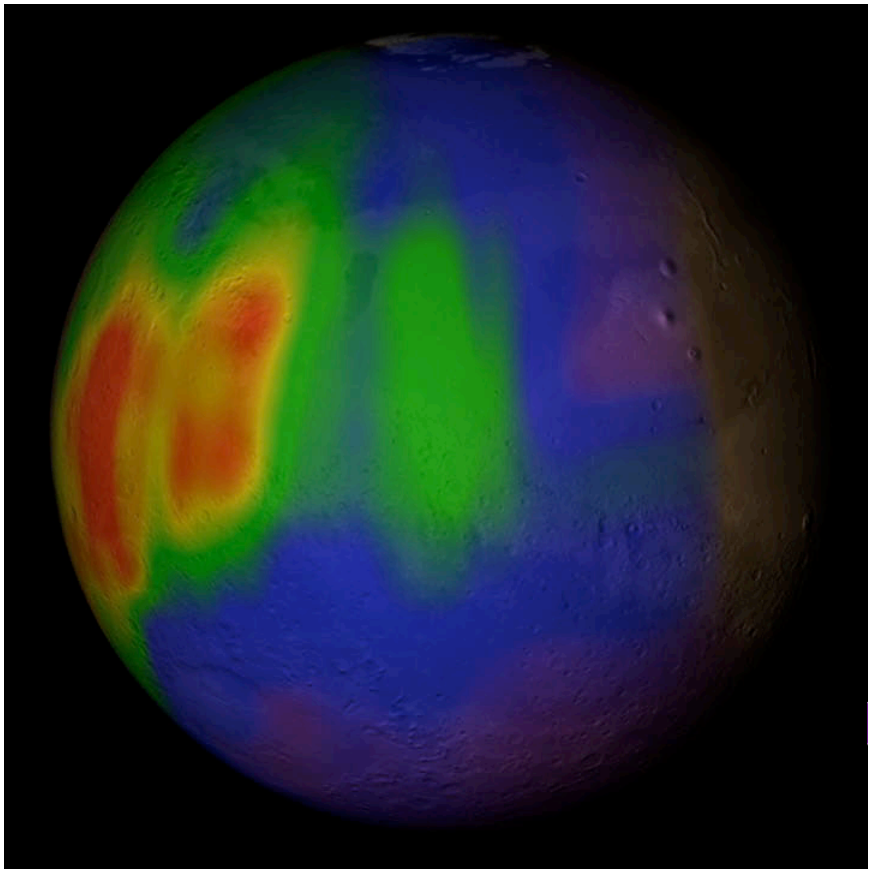
Methane in the Martian Atmosphere

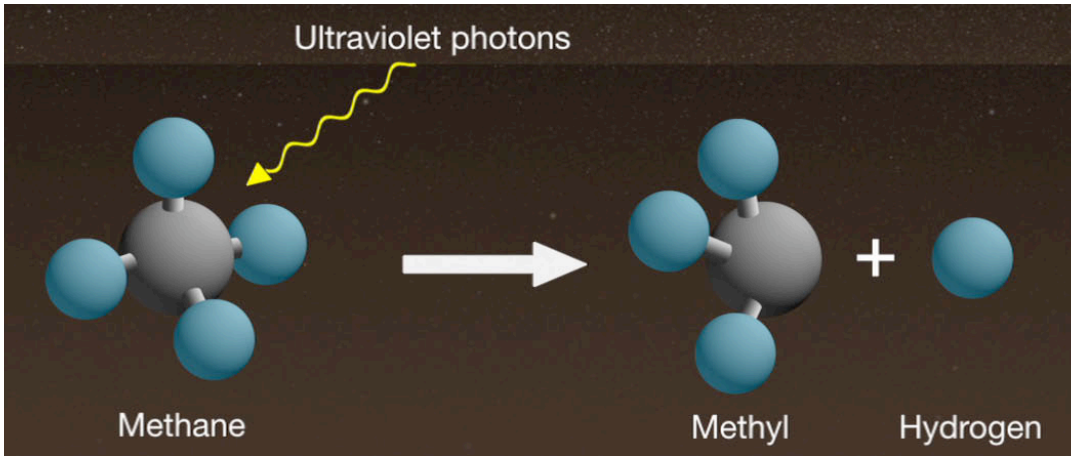
- Methane gas was recently detected in Mars' atmosphere using groundbased telescopes
- The methane gas distribution is patchy and changes with time
- Most methane in Earth's atmosphere is produced by life, raising questions about its origin on Mars



View of Mars colored according to the methane concentration observed in the atmosphere. Warm colors depict high concentrations.

Recent Release of Methane

- Methane in the atmosphere should be destroyed by UV light within a few hundred years
- Methane observed now must therefore have been produced recently
- Variations in space and time suggest that it was recently released from the subsurface in localized areas



UV photons have enough energy to break molecules apart

The Big Picture

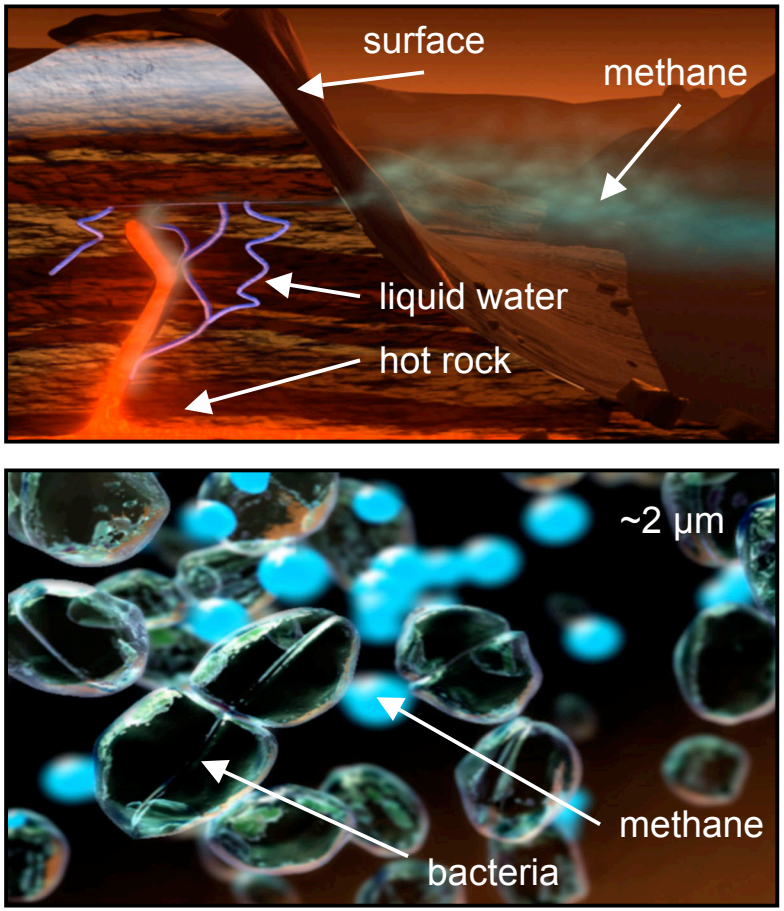
- Where can the methane come from? From analogy with Earth, there are two leading theories for the origin of recent subsurface methane at Mars:

  1. Methane is produced by water-rock interactions

  2. Methane is produced by bacteria, in regions where liquid water is found

  Either theory implies that the Martian subsurface is dynamic

- Future observations can test for trace chemicals associated with each process



Methane on Mars could be produced chemically through liquid/rock interactions (top) or biologically (bottom)

For more information…

Press Releases

- space.com - 1/15/09 - “Mars Methane: Geology or Biology?”
  http://www.space.com/scienceastronomy/090115-mars-methane-news.html

Images

- All images (and accompanying animations) can be found at:
  http://www.nasa.gov/mission_pages/mars/news/marsmethane_media.html

Source Article (on-campus login may be required to access journals)

- Mumma et al., ‘Strong Release of Methane on Mars in Northern Summer 2003’, *Science*, **323**, p. 1041 DOI: 10.1126/science.1165243, 2009.
  http://www.sciencemag.org/cgi/content/abstract/323/5917/1041

Related Articles (on-campus login may be required to access journals)

- Formisano et al., ‘Detection of Methane in the Atmosphere of Mars’, *Science*, **306**, p.1758 DOI: 10.1126/science.1101732, 2004.
  http://www.sciencemag.org/cgi/content/abstract/306/5702/11758
- Krasnopolsky et al., ‘Detection of methane in the martian atmosphere: evidence for life?’, *Icarus*, **172**, p.537, doi:10.1016/j.icarus.2004.07.004, 2004.
  http://tinyurl.com/krasnopolskyIcarus2004