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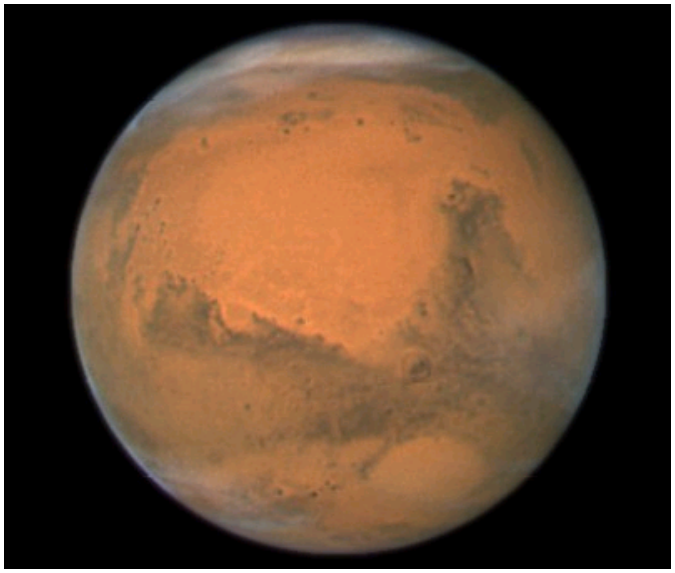
Obama's dream of Mars at risk from radiation

Nov 4, 2010 15 comments



The red planet, as seen by the Hubble Space Telescope

Higher levels of space radiation between 2020 and 2040 could endanger US President Barack Obama's vision for a manned mission to Mars, according to a NASA scientist. The result of two separate solar-activity cycles, which are both predicted to hit their maximum during the period, the increased radiation could cause radiation sickness and an increased cancer risk for any astronauts venturing away from the safety of the Earth's atmosphere.

In April Obama laid out his plans for the future of US space travel: NASA would once again have the technology to carry humans beyond low Earth orbit by 2025, with an asteroid the first likely target. He went on to suggest that astronauts could be orbiting Mars by the mid-2030s. Obama's plans sit alongside the ambitions of other countries to expand their human-spaceflight programmes; the head of China's space agency has recently suggested a manned Chinese Moon mission might be possible by 2025.

However, John Norbury of the NASA Langley Research Center in Virginia suggests there might be an increase in solar activity over this period, possibly hampering the planned missions. In a review paper, published in the journal *Advances in Space Research*, Norbury brings together several previous studies on solar-activity cycles and applies the findings specifically to the period 2020–2040.

Radiation floods the solar system

Norbury first looked at the well-established Schwabe cycle, where sunspot numbers reach a peak roughly once every 11 years. The height of this activity, or solar maximum, sees a marked increase in solar flares, as well as coronal mass ejections (CMEs), both mechanisms for flooding the solar system with proton radiation. Norbury predicts the next three Schwabe maxima will occur in 2013, 2024 and 2035, with the later two dates coinciding almost exactly with America and China's space-faring aspirations.

However, the intensity of each solar maximum is also thought to

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John Norbury
Lewis Dartnell
Mike Hapgood

oscillate over a period, called the Gleissberg cycle, of roughly every 80–90 years. A Gleissberg maximum is then, in effect, a double maximum. But pinning down the exact length of this cycle is more difficult because sunspot records stretching back over previous centuries are either incomplete or not as accurate as modern-day data. Instead, information from sunspot records has to be combined with data from other “proxies”.

One such proxy is the carbon-14 record. During a solar minimum, fewer galactic cosmic rays are intercepted by the Sun's lower magnetic activity, and so more bombard the Earth's atmosphere, where they interact with atmospheric nitrogen that then decays into carbon-14. So a decrease in carbon-14 represents an increase in solar-activity levels.

Apollo astronauts were lucky

Norbury combined sunspot records with studies of carbon-14 trapped in tree rings, along with nitrate records from ice cores, to suggest the last three Gleissberg maxima occurred in 1790, 1870 and 1950. Such a pattern implies the next Gleissberg maximum should fall between 2020 and 2040, meaning more frequent solar events and a higher chance of those leaving low Earth orbit being irradiated, something the short NASA *Apollo* missions were fortunate to avoid.

“The Moon missions were just blind lucky,” explains Lewis Dartnell, an astrobiologist at University College, London. “The astronauts would have experienced radiation sickness and a higher risk of future cancer if they'd been hit,” he adds. However, crews travelling to an asteroid or Mars, journeys that take months rather than days, are subject to a much greater risk. “The worse-case scenario is that if you radiate a crew sufficiently, they'd all succumb to radiation sickness within a few days and essentially vomit and diarrhoea themselves to death within an enclosed capsule,” Dartnell told *physicsworld.com*.

Potentially there are ways to protect astronauts, including using polythene and the spacecraft's water supply as radiation shielding, but there is a problem. “The particles are scattered by hitting nuclei within the water or polythene; it's essentially a nuclear interaction and you end up producing secondary radiation,” Mike Hapgood of the Rutherford Appleton Laboratory in the UK explains. Hapgood and colleagues are currently working on an alternative technique that involves surrounding the spacecraft with a plasma shield to deflect incoming protons without creating secondary radiation. However, with the idea still in its infancy, Hapgood believes the chances of it being ready in time for Obama's 2030s Mars shot “strongly depends on future investment”.

About the author

Colin Stuart is a science writer and astronomer based in London

15 comments

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1 **reader01**
Nov 4, 2010 5:14 PM

Plasma shield or new materials

For construction of inner cabins of space rocket could be used materials which are used at future fusion reactors. So it is possible to solve these two problems at once.

Offensive? Unsuitable? Notify Editor

2 **Zebrev**
Nov 5, 2010 12:46 PM
Moscow, Russian Federation

Never...

Men will never land Mars. It's obvious.

Offensive? Unsuitable? Notify Editor

3 **KV124**
Nov 5, 2010 1:47 PM
Boca Raton, United States

Never?

Never is a very powerful word. Many a foolish phrase have begun with Never....

Offensive? Unsuitable? Notify Editor

4 **talcha2ted**
Nov 6, 2010 12:50 AM

Men arriving on Mars in the near future.

> Quote:
> *Originally posted by **Zebrev***
> Men will never land Mars. It's obvious.

This is quite correct and can be derived from fundamental principles. Women, of course, will get there first!

Offensive? Unsuitable? Notify Editor

5 **xlines**
Nov 6, 2010 10:31 AM

> Quote:
> *Originally posted by **talcha2ted***
> > Quote:
> > *Originally posted by **Zebrev***
> > Men will never land Mars. It's obvious.
>
> This is quite correct and can be derived from fundamental principles. Women, of course, will get there first!

LOL! High five! :)

Offensive? Unsuitable? Notify Editor

6 **reader01**
Nov 6, 2010 1:31 PM

radiation protection

I think that if there will be any space rocket that use any kind of nuclear power motor than it will need radiation protection anyway.

Offensive? Unsuitable? Notify Editor

7 **jpivarski**
Nov 6, 2010 3:47 PM

I bet five feet of concrete would do it...

... or as many inches of lead. It's just too bad it's hard to get heavy things into orbit (and accelerate/decelerate them). A shield made of heavy inert material might even be able to convert the radiation into a heat/power source, depending on the particle flux (typically MeV energies per particle from the sun).

Offensive? Unsuitable? Notify Editor

8 **reader01**
Nov 7, 2010 12:29 PM

> Quote:
> *Originally posted by **jpivarski***
> ... or as many inches of lead. It's just too bad it's hard to get heavy things into orbit (and accelerate/decelerate them). A shield made of heavy inert material might even be able to convert the radiation into a heat/power source, depending on the particle flux (typically MeV energies per particle from the sun).

Why only to use this solar particle as a source of heat? I think it is a good idea to use these particles for nuclear power energy for rocket. I know, it is your idea and not bad.

Offensive? Unsuitable? Notify Editor

9 **reader01**
Nov 8, 2010 4:27 PM

I know this is not probably possible

But, is there any chance to explore mirrors as source of power at outer space? Or exist such mirrors ,shield, that can reflect radiation out of surface of rocket. I mean exist any such material??

Offensive? Unsuitable? Notify Editor

10 **jjeherrera**
Nov 8, 2010 5:20 PM
Ciudad Universitaria, Mexico

> Quote:
> Hapgood and colleagues are currently working on an alternative technique that involves surrounding the spacecraft with a plasma shield to deflect incoming protons without creating secondary radiation. However, with the idea still in its infancy, Hapgood believes the chances of it being ready in time for Obama's 2030s Mars shot “strongly depends on future investment”.

The idea was actually proposed back in the 60's, but there hasn't been a strong motivation to pursue it. So it will definitely “strongly depends on future investment”.

Offensive? Unsuitable? Notify Editor

11 **goldiesal**
Nov 9, 2010 3:07 AM

Nice articles,these all information are new for me i never know about it.Obama dream about Moon is interesting.i think we not wait for a long time to start living on moon.
www.healthproductrev…spa-acai-review.html

Offensive? Unsuitable? Notify Editor

12 **rechardwilb**
Nov 12, 2010 12:59 PM

Going to Mars is the need of the hour. There must be some way out to solve this problem and clear the way to Mars.leanspa

Offensive? Unsuitable? Notify Editor

13 **kentmarsh**
Nov 14, 2010 10:42 AM

I can understand the frustration of a geologist who would love to be there to turn a rock over or take a hammer to a formation, without expending hours of remote manipulation. Or a biologist wanting to take a scoop of the regolith and get it straight into a test tube! I can also appreciate the romantic appeal.
Extamax

Offensive? Unsuitable? Notify Editor

14 **Newbeak**
Nov 14, 2010 3:26 PM

Ion propulsion

I believe plasma rockets will be indispensable for future exploration of the solar system.Far less fuel needs to be carried,and travel times can be greatly reduced.See: www.physorg.com…news174031552.html

Offensive? Unsuitable? Notify Editor

15 **jessiemcc**
Nov 26, 2010 11:02 AM

I would say if there is, they should bring humanoid robots to help them in there research, and bring lots of anything. lol
Brainquicken

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