

# NASA: Mars Rover Will Likely Rove No More

by Joe Palca



NASA/JPL-Caltech

The Mars Rover team most recently tried driving Spirit backward in an effort to extricate the vehicle, seen here from the rover's point of view on Jan. 23. The effort resulted in a few inches of movement and lifted the rover slightly.

January 26, 2010

NASA is abandoning for now plans to try to extricate the Mars Exploration Rover named Spirit from a sand trap it has been stuck in since April 2009.

The decision has been forced on mission managers by the Martian weather; it will soon be winter in the area where Spirit is stuck.

Just like on Earth, during the Martian winter, the sun is lower in the sky. That means less sunlight will reach the Spirit's solar panels, and that means less power to operate the rover.

Another complication in extracting the rover is that only four of its six motorized wheels are working.

Rover drivers are now trying to change the tilt of the rover so its solar panels point more toward the sun, but they expect that in a few weeks, the rover will shut itself down and fall into hibernation mode, from which it likely won't emerge for six months or so.

Even if it wakes up at the end of winter, its roving days are probably over. Mission managers are not at all optimistic they'll ever extricate the rover from its sand trap, and researchers are already making plans to use Spirit as a stationary science platform.

Page last updated at 17:59 GMT, Tuesday, 26 January 2010

## Nasa accepts Spirit Mars rover 'stuck for good'

by Jonathan Amos  
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**The US space agency (Nasa) has conceded defeat in its battle to free the Spirit rover from its Martian sand trap.**

The vehicle became stuck in soft soil back in May last year and all the efforts to extricate it have failed.

Nasa says Spirit, which landed on the Red Planet just over six years ago, will now live out its remaining days as a static science station.

The robot geologist has taken thousands of images and found evidence in Mars' rocks of a wetter, warmer past.

'Spirit has encountered a golfer's worst nightmare - the sand trap that no matter how many strokes you take, you can't get out of it,' said Doug McCuiston, director of the Mars exploration programme at Nasa headquarters in Washington DC.

'But this is not a day to mourn Spirit; this is not a day of loss at this point. Spirit will continue to make contributions to science.'

**Like a 'polar bear'**



Spirit was given a primary mission on the Red Planet of three months

The robot's predicament has been exacerbated by the failure of two of its six wheels. Without the additional traction, the agency now accepts that further efforts to try to escape the soft soil will be fruitless.

Instead, the mission team is concentrating on trying to get the rover tilted in a manner that will maximise the amount of sunlight falling on its solar panels during the approaching winter months. Engineers have a plan to rock the vehicle back and forth to acquire a more favourable posture.

Even so, it is likely Spirit will maintain so little energy in its batteries that it will go into hibernation, perhaps as soon as April. It will not emerge from that state until August or September, when the Sun gets high enough in the Martian sky to power up the rover's systems.

'The rover will be like a polar bear, hibernating; and it could be for many months - of the order of six months,' explained John Callas, Spirit's project manager at Nasa's Jet Propulsion Laboratory.

'We have to be prepared to go through a period where we are not hearing from the rover for an extended length of time.'

Far from being downbeat, Professor Steve Squyres, the rover's principal investigator, expressed some excitement at the scientific possibilities of a static vehicle.

He said the signal from a stationary Spirit could be tracked very accurately, to measure how much Mars wobbles on its axis. This could establish definitively whether the planet had a solid or a liquid core - information that would inform scientists about the planet's magnetic history.

This was, he said, "totally new science, never been done before - really fundamental stuff".

'This is something that I didn't really think very much about when we put a rover on the surface of Mars because we were thinking about the geology on the surface. But when you delve deeply into what this vehicle is capable of, you find new tricks; and it's something we're really excited about.'

### **Watery past**

Spirit was one of two rovers that Nasa landed on the planet in the January of 2004. The second vehicle, Opportunity, continues to roll freely on the surface.

Spirit was targeted at the 170km-wide Gusev Crater, a near-equatorial location in the southern hemisphere that orbital images had suggested might once have held a giant lake.

The investigation of this watery history got off to a slow start. Spirit initially found rocks that had undergone very limited alteration by exposure to moisture.

It was only after a 2.5km drive to nearby hills that the instrumented robot discovered rocks

and soils that had experienced extensive exposure to water.

Nasa has spent more than \$900m (£560m) on its Mars Exploration Rover programme, from design through to current operations. At the moment, the agency is spending about \$20m a year.

The data acquired by the vehicles has generated about 100 scholarly papers, including special editions of the leading international journals Science and Nature.



Spirit became embedded in the area the mission team calls "Troy"

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