Where should the European Mars rover land?

September 4 2014, by Elizabeth Howell

An artist's conception of the European Space Agency's ExoMars rover, scheduled to launch in 2018. Credit: ESA

Picking a landing site on Mars is a complex process. There's the need to balance scientific return with the capabilities of whatever vehicle you're sending out there. And given each mission costs millions (sometimes billions) of dollars—and you only get one shot at landing—you can bet mission planners are extra-cautious about choosing the right location.

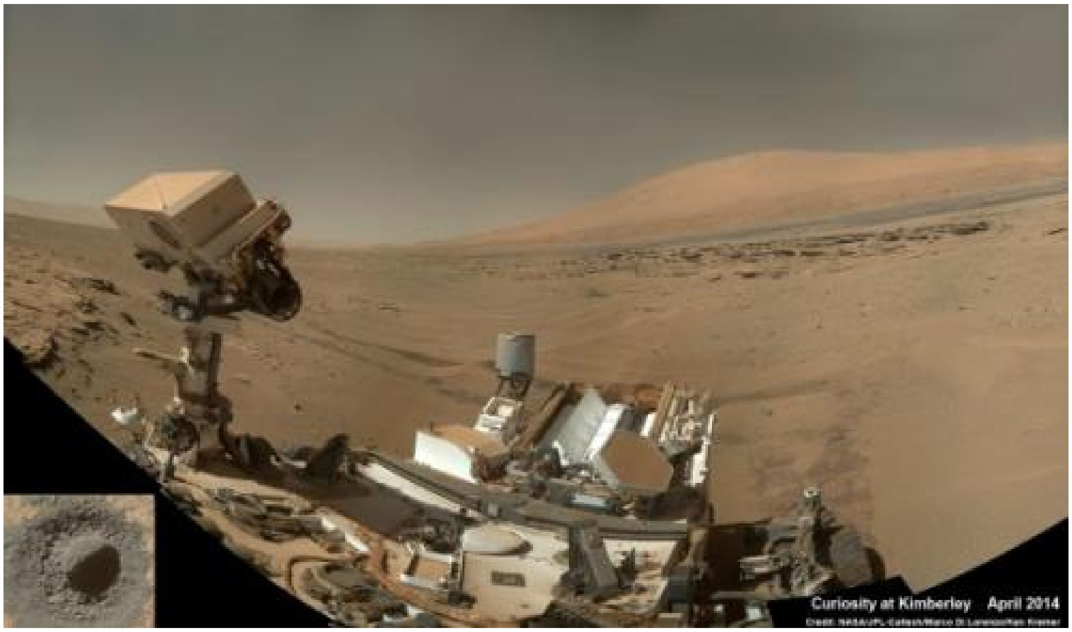
A recent paper in Eos details just how difficult it is to choose where to put down a rover, with reference to the upcoming European ExoMars mission that will launch in 2018.

In March, scientists came together to select the first candidate landing sites and came up with four finalist locations. The goal of ExoMars is to look for evidence of life (whether past or present) and one of its defining features is a 2-meter (6.6-foot) drill that will be able to bore below the surface, something that the NASA Curiosity rover does not possess.

"Among the highest-priority sites are those with subaqueous sediments or hydrothermal deposits," reads the paper, which was written by Bradley Thomson and Farouk El-Baz (both of Boston University). Of note, El-Baz was heavily involved in landing site selection for the Apollo missions.

"For example," the paper continues, "some of the clearest morphological indicators of past aqueous activity are channel deposits indicative of past fluvial activity or the terminal fan, or delta deposits present within basins."

But no landing site selection is perfect. The scientists note that Curiosity, for all of its successes, seems unlikely to achieve its primary science objectives in its two-year mission because the commissioning phase took a while, and the rover moves relatively slowly.

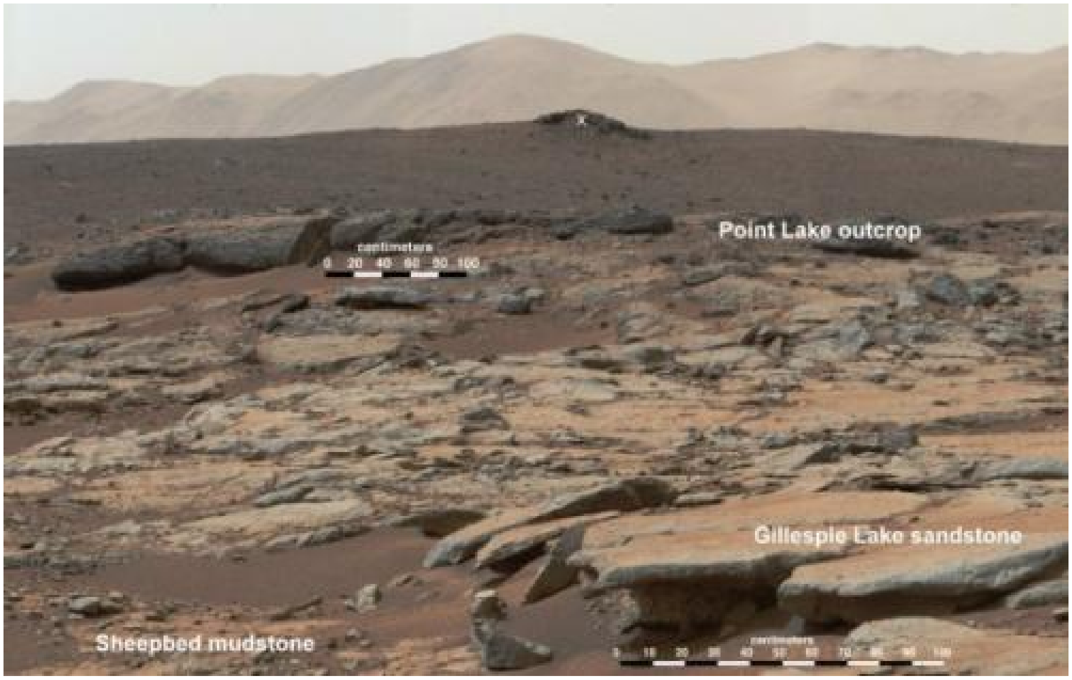


Curiosity snaps selfie at Kimberley waypoint with towering Mount Sharp backdrop on April 27, 2014 (Sol 613). Inset shows MAHLI camera image of rovers mini-drill test operation on April 29, 2014 (Sol 615) into “Windjama” rock target at Mount Remarkable butte. MAHLI color photo mosaic assembled from raw images snapped on Sol 613, April 27, 2014. Credit: NASA/JPL/MSSS/Marco Di Lorenzo/Ken Kremer

That said, NASA has argued that the rover achieved its goal of finding past habitable environments already, with discoveries such as extensive evidence of a past potentially life-bearing lake now called Yellowknife Bay.

What could change the area of the landing could be using different types of entry, descent and landing technologies, the authors add. If the parachute opened depending on how far the spacecraft was from the ground—instead of how fast it was going—this could make the landing ellipse smaller.

This could place the rover "closer to targets of interest that are too rough for a direct landing and reducing necessary traverse distances," the paper says.



Outcrops in Yellowknife Bay are being exposed by wind driven erosion. These rocks record superimposed ancient lake and stream deposits that offered past environmental conditions favorable for microbial life. This image mosaic from the Mast Camera instrument on NASA's Curiosity Mars rover shows a series of sedimentary deposits in the Glenelg area of Gale Crater, from a perspective in Yellowknife Bay looking toward west-northwest. The "Cumberland" rock that the rover drilled for a sample of the Sheepbed mudstone deposit (at lower left in this scene) has been exposed at the surface for only about 80 million years. Credit: NASA/JPL-Caltech/MSSS

More information: The complete paper is availabler online: onlinelibrary.wiley.com/doi/10 … 002/2014EO350001/pdf

Source: Universe Today

Citation: Where should the European Mars rover land? (2014, September 4) retrieved 18 April 2024 from https://phys.org/news/2014-09-european-mars-rover.html