

1 Mars Is Far, Far Away.

Perkowitz reminds us that the only other celestial destination we've managed to set foot on is our own moon, which is a mere 250,000 miles away; Mars outdistances us by 140 million on an average day. NASA scientists have suggested that the journey would take at least eight months, not to mention a toll on the physical and psychological health of the astronauts, says Perkowitz: "Extended time in space under essentially zero gravity has adverse effects, including loss of bone density and muscle strength, which astronauts experienced after months aboard the International Space Station."

2 The Phones Don't Work.

Communication with Mars would present a major challenge—greater than any previous space mission, Perkowitz says, with a lag time that could put astronauts at risk in an emergency. "Even at the closest approach of Mars to the Earth, thirty-six million miles, nearly seven minutes would go by before anything said over a radio link could receive a response," Perkowitz writes. Can you hear me now?

3 It's No Club Med.

Perkowitz calls Mars a "harsh world," with temperatures averaging -80 degrees Fahrenheit (*that's cold*). You can't breathe there. And there's more, says Perkowitz: Mars's "thin atmosphere, mostly carbon dioxide, is unbreathable and supports huge dust storms; it is subject to ultraviolet radiation from the sun that may be harmful; and its size and mass give it a gravitational pull that is only 38 percent—which astronauts exploring the surface in heavy protective suits would welcome, but could also further exacerbate bone and muscle problems." Pack warm.

1 You Can Get a Drink. Following the discovery that there were once oceans on Mars, NASA has reported that there is currently liquid water flowing over parts of the planet. "This discovery increases the odds that there is currently life on Mars—picture microbes, not little green men—while heightening interest in NASA's proposal to send astronauts there by the 2030s as the next great exploration of space and alien life," Perkowitz writes.

2 We Have the Moxie. "Mars also has considerable oxygen bound up in its atmospheric CO₂," Perkowitz explains. "In the MOXIE process (Mars OXYgen In situ resource utilization Experiment), electricity breaks up CO₂ molecules into carbon monoxide and breathable oxygen. NASA proposes to test this oxygen factory aboard a new Mars rover in 2020 and then scale it up for the manned mission."

3 A New Take on 'Local Food.'

Using processes that were successfully tested on the International Space Station—allowing astronauts to veg out on the first lettuce ever sprouted in outer space—a team on Mars should be able to grow some of their own food, Perkowitz says. " 'Living off the land' on Mars, though it might affect the local environment, would hugely improve the odds for success of the initial mission—and for eventual settlements there," he says, adding, "We're closer to Mars than many may think."