After Orion launch, big steps lie ahead for Mars trip, NASA says

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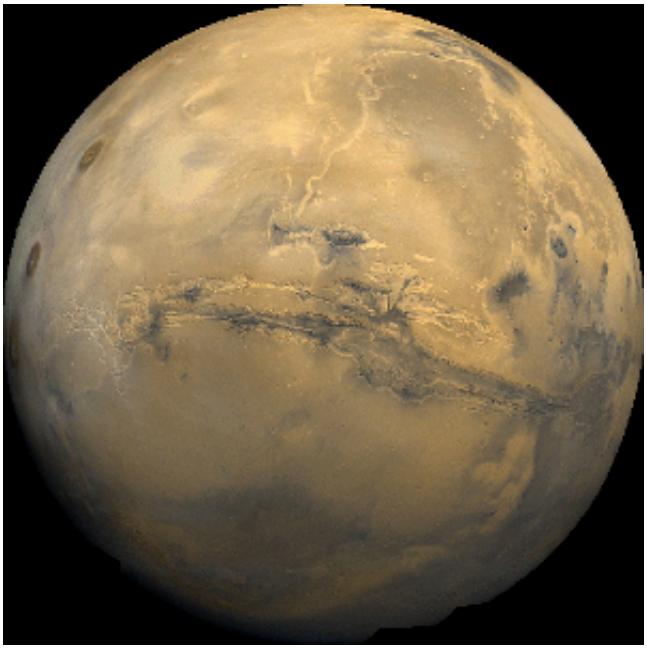

Valles Marineris, Mars. Credit: NASA

If creating the new Orion space capsule or developing a new deep-space rocket are complex and critical breakthroughs, NASA's remaining challenges to send humans to Mars are no less daunting, officials said Tuesday.

NASA's next-generation capsule, Orion, is ready for its maiden launch Thursday at 7:05 a.m. from Cape Canaveral Air Force Station. Space agency officials call it the first step for a human journey to Mars.

"It is truly a beautiful planet. It has fabulous vistas. It has a number of resources that we are finding out about, and we are planning to move toward human exploration of Mars," Jim Green, NASA's Planetary Science Division director, said during a news briefing held jointly in Washington and Kennedy Space Center.

Yet the Orion, and the Space Launch System rocket being developed for a 2018 launch, are only the first steps. Development of human life support, fuel, communication and Martian landing systems are in much earlier development. Those challenges and budget concerns leave NASA officials saying they hope to reach Mars sometime in the 2030s.

The overriding challenge is that it would take astronauts more than a year to get there, so they'll have to take everything they need or have it waiting for them along the way, said Jason Crusan, director of NASA's Advanced Exploration Systems Division.

"We describe it as ... going from an Earth-reliant to an Earth-independent phase," Crusan said.

Among the challenges:

-The agency thinks it impractical to carry enough liquid or solid fuel. So NASA is exploring high-powered solar-electric engines to propel Orion through space. That could be viable by the end of this decade, said James Reuther, NASA's deputy associate administrator for space-technology mission programs.

-NASA's current communication systems are radio-based and only carry a tiny fraction of the information necessary. The agency is working on laser-based optical-communication technologies. It could be workable by the early 2020s, Reuther said.

-To land on Mars, NASA plans to adapt technologies used to land the Curiosity Martian rover two years ago. Scaling that to handle a far-heavier human craft may not happen until the early 2030s, he said.

-NASA must develop living quarters for the astronauts' long journeys and for stays in orbit around Mars and on that planet. The agency is considering sending up habitats in advance, placing them in orbit near Earth's moon, in orbit around Mars and on Mars' surface. Orion astronauts could use them on the way, Crusan said.

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