

Mars touchdown: NASA spacecraft survives supersonic plunge

November 27 2018, by Marcia Dunn



An engineer smiles next to an image of Mars sent from the InSight lander shortly after it landed on Mars in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (Al Seib/Los Angeles Times via AP, Pool)

Minutes after touching down on Mars, NASA's InSight spacecraft sent back a "nice and dirty" snapshot of its new digs. Yet the dust-speckled image looked like a work of art to scientists.

The photo revealed a mostly smooth and sandy terrain around the [spacecraft](#) with only one sizable rock visible.

"I'm very, very happy that it looks like we have an incredibly safe and boring landing location," project manager Tom Hoffman said after Monday's touchdown. "That's exactly what we were going for."

A better image came hours later and more are expected in the days ahead, after the dust covers come off the lander's cameras.

The spacecraft arrived at Mars after a perilous, supersonic plunge through its red skies that took just six minutes.

"Touchdown confirmed!" a flight controller called out just before 3 p.m. EST, setting off jubilation among scientists at NASA's Jet Propulsion Laboratory in Pasadena, California, who had waited in white-knuckle suspense for word to reach across 100 million miles (160 million kilometers) of space.

It was NASA's eighth successful landing at Mars since the 1976 Viking probes, and the first in six years. NASA's Curiosity rover, which arrived in 2012, is still on the move on Mars.



From left, NASA officials Jim Bridenstine, Michael Watkins, Tom Hoffman, Bruce Banerdt, Andrew Klesh and Elizabeth Barrett make statements under a photograph sent from Mars by the InSight lander at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/Marcio Jose Sanchez)

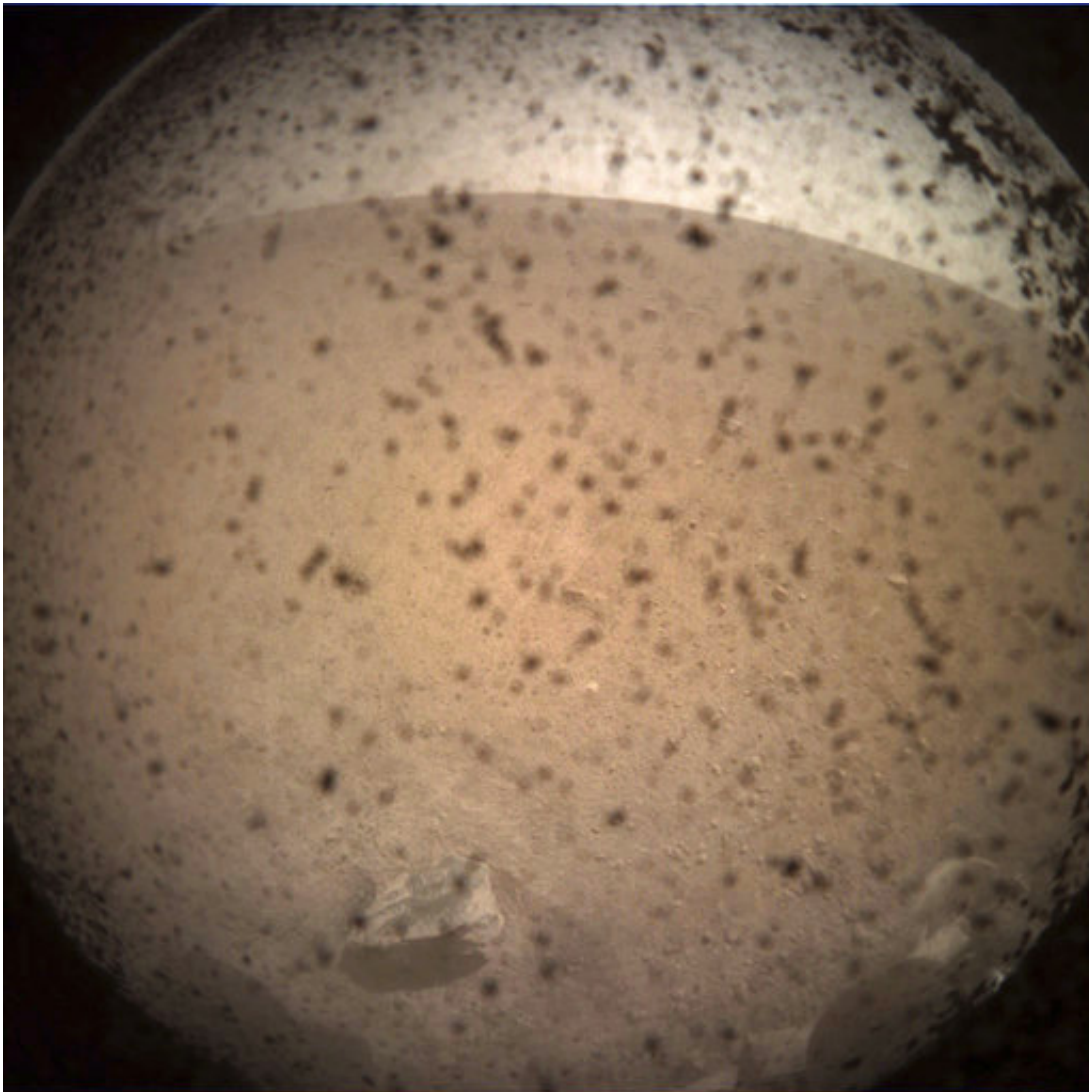
Because of the distance between Earth and Mars, it took eight minutes for confirmation to arrive, relayed by a pair of tiny satellites that had been trailing InSight throughout the six-month, 300-million-mile (482-million-kilometer) journey.

"Flawless," declared JPL's chief engineer, Rob Manning. "Sometimes things work out in your favor."

InSight, a \$1 billion international project, includes a German mechanical mole that will burrow down 16 feet (5 meters) to measure Mars' internal heat. The lander also has a French seismometer for measuring quakes, if

they exist on our smaller, geologically calmer neighbor. Another experiment will calculate Mars' wobble to reveal the makeup of the planet's core.

Late Monday, NASA reported the spacecraft's vital solar arrays were open and recharging its batteries.



This photo provided by NASA shows the first image acquired by the InSight Mars lander after it touched down on the surface of Mars Monday, Nov. 26, 2018. Debris kicked up by the lander's rockets covers the camera's protective shield, which will later be removed. (NASA/JPL-Caltech via AP)

Over the next few "sols"—or Martian days of 24 hours, 39½ minutes—flight controllers will assess the health of InSight's all-important robot arm and its science instruments. It will take months to set up and fine-tune the instruments, and lead scientist Bruce Banerdt said he doesn't expect to start getting a stream of solid data until late next spring.

Banerdt called InSight's first snapshot of the surface the first bit of science, albeit "nice and dirty." He said the image would be cleaned and the black specks would disappear. That photo came from a camera low on the lander. Late Monday, NASA released a clean photo taken by a higher camera that showed part of the lander and the landscape.

The 800-pound (360-kilogram) InSight is stationary and will operate from the same spot for the next two years, the duration of a Martian year.

"In the coming months and years even, history books will be rewritten about the interior of Mars," said JPL's director, Michael Watkins.



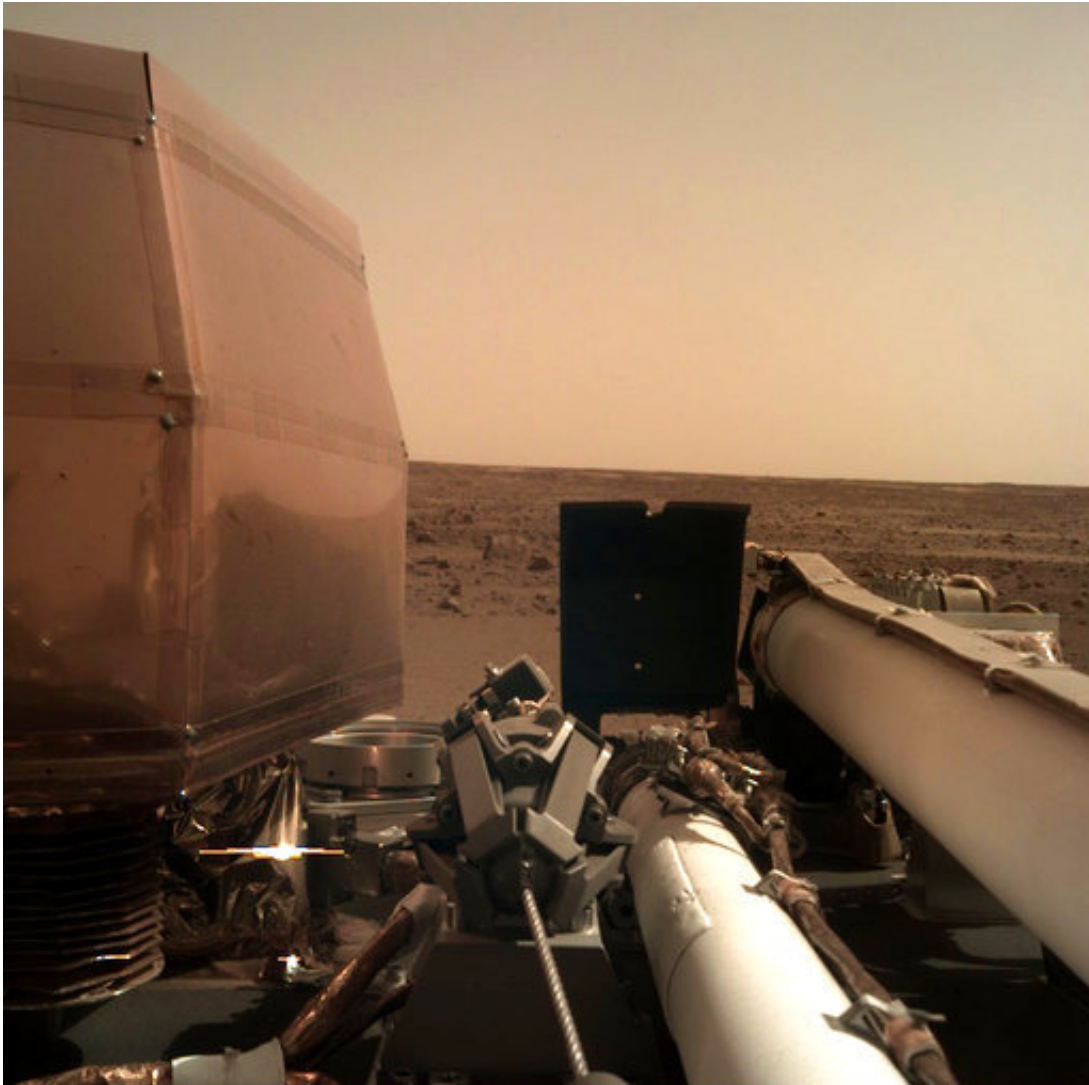
NASA officials, from left, Michael Watkins, Tom Hoffman, and Bruce Banerdt celebrate after the Mars landing of InSight at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/Marcio Jose Sanchez)

NASA went with its old, straightforward approach this time, using a parachute and braking engines to get InSight's speed from 12,300 mph (19,800 kph) when it pierced the Martian atmosphere, about 77 miles (114 kilometers) up, to 5 mph (8kph) at touchdown. The danger was that the spacecraft could burn up in the atmosphere or bounce off it.

Many Mars-bound spacecraft launched by the U.S., Russia and other countries have been lost or destroyed over the years, with a success rate of just 40 percent, not counting InSight.

The three-legged InSight settled on the western side of Elysium Planitia, the plain that NASA was aiming for.

Museums, planetariums and libraries across the U.S. held viewing parties to watch the events unfold at JPL. NASA TV coverage was also shown on the giant screen in New York's Times Square, where crowds huddled under umbrellas in the rain.



This photo provided by NASA shows an image on Mars that its spacecraft called InSight acquired using its robotic arm-mounted, Instrument Deployment Camera (IDC) after it landed on the planet on Monday, Nov. 26, 2018. The NASA spacecraft designed to drill down into Mars' interior landed on the planet Monday after a perilous, supersonic plunge through its red skies, setting off jubilation among scientists who had waited in white-knuckle suspense for

confirmation to arrive across 100 million miles of space. (NASA via AP)

"What an amazing day for our country," said Jim Bridenstine, presiding over his first Mars landing as NASA's boss.

Mars' well-preserved interior provides a snapshot of what Earth may have looked like following its formation 4.5 billion years ago, according to Banerdt. While Earth is active seismically, Mars "decided to rest on its laurels" after it formed, he said.



Engineer Kris Bruvold, bottom center, celebrates as the InSight lander touch downs on Mars in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/(Al Seib /Los Angeles Times via AP, Pool)

By examining and mapping the interior of Mars, scientists hope to learn why the rocky planets in our solar system turned out so different and why Earth became a haven for life.

Still, there are no life detectors aboard InSight. NASA's next mission, the Mars 2020 rover, will prowel for rocks that might contain evidence of ancient life. The question of whether life ever existed in Mars' wet, watery past is what keeps driving NASA back to the fourth rock from the sun.

After InSight landed, the two experimental satellites zoomed past Mars, their main job done. One took one last photo of the red planet that the satellites' chief engineer, Andy Klesh, titled "farewell to InSight ... farewell to Mars."



This illustration made available by NASA in October 2016 shows an illustration of NASA's InSight lander about to land on the surface of Mars. NASA's InSight

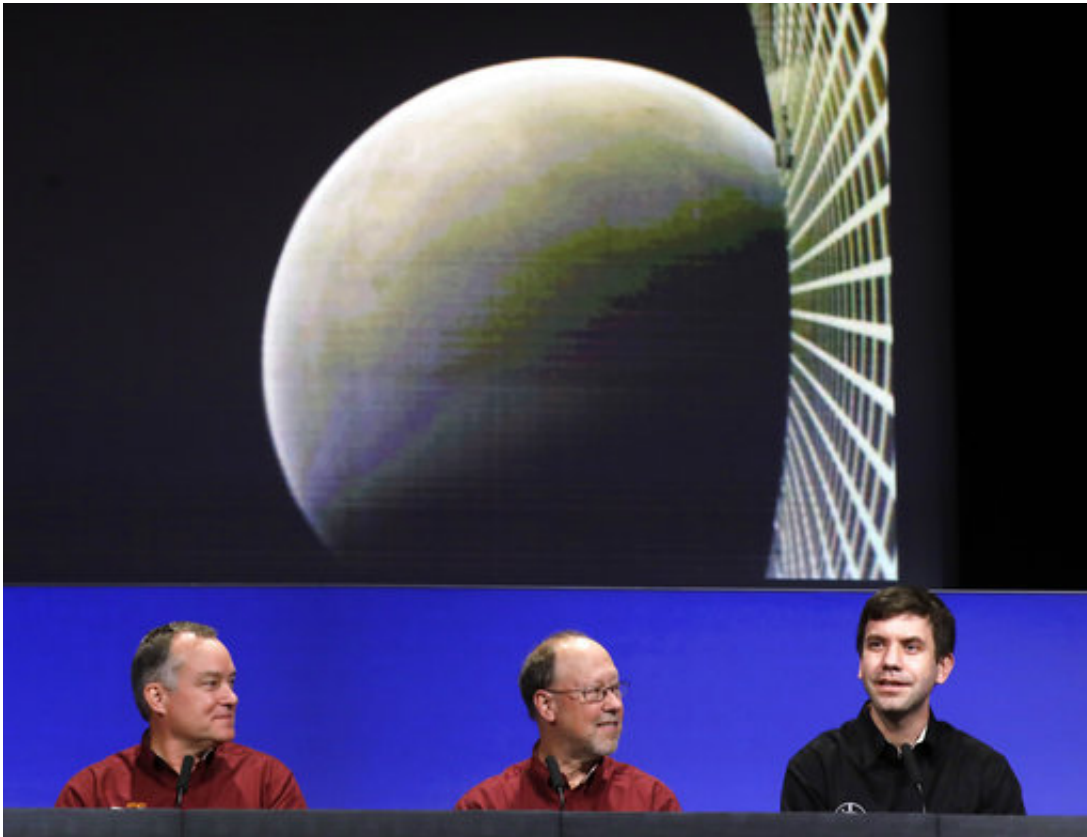
spacecraft will enter the Martian atmosphere at supersonic speed, then hit the brakes to get to a soft, safe landing on the alien red plains. After micromanaging every step of the way, flight controllers will be powerless over what happens at the end of the road, nearly 100 million miles away. (NASA/JPL-Caltech via AP



Engineers celebrate as the InSight lander touch downs on Mars in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/(Al Seib /Los Angeles Times via AP, Pool)



Engineers embrace after the Mars landing of InSight in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (Al Seib/Los Angeles Times via AP, Pool)



NASA official Andrew Klesh, right, speaks next to his colleagues, project manager Tom Hoffman, left, and lead scientist Bruce Banerdt, under a photograph taken by one of the mini satellites that was trailing the InSight lander, at NASA's Jet Propulsion Laboratory, Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/Marcio Jose Sanchez)



Engineers monitor the landing of InSight in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (Al Seib /Los Angeles Times via AP, Pool)



InSight project manager Tom Hoffman points at an image sent from the InSight lander after the space craft landed on Mars in the mission support area of the space flight operation facility at NASA's Jet Propulsion Laboratory Monday, Nov. 26, 2018, in Pasadena, Calif. (AP Photo/(Al Seib /Los Angeles Times via AP, Pool)

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