China successfully lands rover Zhurong on Mars

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20 May 2021

The China National Space Administration (CNSA) has successfully landed and deployed the rover component of its Mars mission Tianwen-1. The lander and rover safely touched down on Mars during the early hours of May 15, China time, according to China's state media. The rover, named Zhurong, was brought online in the following days, and its first images were released by the CNSA on May 19.

The landing makes China the third country to achieve a soft landing on the Red Planet, after the Soviet Union and the United States, and second after the US to land and deploy a rover on the Martian surface. The CNSA also achieved a new landmark in planetary exploration—having a successful orbiter, lander and rover as part of the agency's first mission to Mars, an immense scientific and technical achievement.

Tianwen-1 also deployed a small camera during its cruise to Mars to take a self-portrait of the spacecraft en route to its final destination, another first. The ejected camera took several photographs of its parent ship and transmitted them to Tianwen-1 via radio, which were then sent back to Earth by the spaceship.

Zhurong is a bit larger than the extraordinarily successful Spirit and Opportunity missions launched by NASA in 2003 and is of similar design. It has six articulated wheels to overcome small obstacles on the Martian surface, is powered by solar panels and communicates back to Earth using Tianwen-1 as a relay (with Europe's Mars Express as a backup). The rover is slated for 90 sols (Martian days) of operations, and one hopes for a longevity and legacy to match or exceed that of its US-built predecessors.

The Tianwen-1 mission ("heavenly questions") was launched last July on a Long March 5 heavy launch vehicle, which has a comparable thrust-to-weight ratio to the Soviet Proton-M, the European Ariane 5 and the American Delta IV. The mission's ongoing accomplishments are a credit to the hundreds of operators in China, as well as those assisting from Argentina, Austria, France and the European Space Agency.

The probes were launched during the same launch window used by the United Arab Emirates Hope spacecraft and NASA's Perseverance rover, a space flight path which takes advantage of the orbits of Earth and Mars to minimize the fuel needed to reach the fourth planet from the Sun. All three missions arrived at Mars this past February within a few weeks of each other.

Instead of immediately deploying the rover, however, the controllers of the Tianwen-1 elected to use the orbiter to more carefully map out potential landing sites for Zhurong. The landing itself took nine minutes, and as is characteristic of Mars missions, because of the vast distance between Earth and Mars, had to be entirely automated. Comments from CNSA officials indicate the rover is operating as designed.

The science objectives for both the rover and orbiter are extensive and ambitious. Like all Mars missions, the overall goals are a deeper understanding of Mars' geological history and ongoing searches for signs of extraterrestrial life. In particular, both Tianwen-1 and Zhurong will use a combined 13 cameras and other scientific instruments to study the chemical composition of the Martian soil and atmosphere, get detailed topological characteristics of dry riverbeds, volcano reliefs, glaciers and areas where wind erosion is prominent, analyze the climate and magnetic field of the planet, and use ground-penetrating radar from both vehicles to map subsurface water ice.

The landing site is in the southern portion of Utopia Planitia, a massive basin in Mars' northern hemisphere which is thought to have once been under water billions of years ago. Indeed, data from NASA's Mars Reconnaissance Orbiter revealed in 2016 that there is a great deal of ice underneath the surface—about as much water as contained in Lake Superior. One of the goals of Zhurong and Tianwen-1 will be to more accurately map this ice.

There are many other intriguing geological features in the region, including cone-shaped features that were likely formed from volcano lava, or even mud. On Earth, so-called mud volcanoes are associated with methane production by bacteria. While that is much more unlikely on Mars, scientists from both China and the United States have expressed a great deal of enthusiasm for an up-close study by Zhurong of these cones, which have so far only been imaged from orbit.

Of course, such scientific and technological achievements by China bring with them a great deal of geopolitical baggage. After the release of the first Zhurong photos, NASA Administrator (and former US Senator from Florida) Bill Nelson offered, "Congratulations to the China National Space Administration on receiving the first images from the Zhurong Mars rover!" The statement continued, "I look forward to future international discoveries, which will help inform and develop the capabilities needed to land human boots on Mars."

His tone was much more confrontational toward China, however, in testimony before the House Appropriations Committee's commerce, justice and science subcommittee that occurred at the same time NASA released his official statement. "[China] is a very aggressive competitor," he proclaimed. "They're going to be landing humans on the moon. That should tell us something about our need to get off our duff and get our Human Landing System program going vigorously."

Underlying such comments are worries that China's rocket technology could eclipse that of the United States, which is seen by the Biden administration as a mortal threat to its continued military build-up against China in the Indo-Pacific region. This "pivot to Asia" began under the Obama administration and was continued under Trump as an attempt by American capitalism to force China to bow to the "international rules-based order," the post-World War II economic and security framework dominated by US imperialism.

Moreover, the Space Force created by then-US President Donald Trump is directly aimed at ensuring US military dominance in all spheres, especially outer space. The US has also announced plans for a space station orbiting the Moon, which would inherently militarize not just orbits around the Earth and Moon, but also the space lanes between them.

While there is no concrete evidence that China is using its space program to develop new military hardware, the launch vehicles, guidance systems and communications networks needed to land on Mars have obvious potential military spin-offs. And these technologies are being further developed. China has announced many more Mars missions in the near future, as well as others to the Moon, including lunar missions that may be crewed.

The country has also launched the first module of its own space station, the Tiangong, which will be about the size of the decommissioned Soviet/Russian space station Mir. It did so isolated from virtually every other country's space program, particularly the US-led International Space Station. Under 2011 legislation, NASA is forbidden from any technology or knowledge exchanges with China. Its sponsor, Republican Frank Wolf, declared, "We don't want to give [China] the opportunity to take advantage of our technology, and we have nothing to gain from dealing with them."

In a rational world, such comments would be laughed at as parochial at best, if they were noticed at all, overshadowed by celebrations at the CNSA's triumphs. The agency's further missions would not be hidden behind a shroud of secrecy cast by the Chinese government and viewed with hostility by the American government, but fully integrated into a globally coordinated space program to understand Mars and the Solar System as a whole.

Such a vision of unified space travel, however, will never manifest as long as the world is divided up into rival capitalist nation-states.