

The Latest Updates of China Deep Space Exploration

Jing PENG, Apr., 2024



Overview

- In 2004, China's Lunar Exploration Program (CLEP) including three phases "orbiting, landing, and sample return" was proposed.
- Before Apr. 2024, eight lunar missions and one Mars mission have been successfully implemented.





Updates of CLEP

- On 17 Dec, 2020, CE-5 return capsule with 1731g lunar regolith sample was landed safely in Siziwangqi, inner Mongolia. After return, lunar sample was extracted and handled in a cabin sealed with nitrogen.
- Till Apr. 2024, six batches of lunar sample have been distributed to scientific community for research. A lot of articles have been published in journals such as science and nature.



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Updates of TianWen-1

- On 23 July 2020, China's first Mars probe TianWen-1 was launched.
- On 15 May 2021, TW-1 entry probe was landed at 109.9°E, 25.1°N on Mars.
- On 22 May 2021, ZhuRong rover was deployed.







Updates of TianWen-1

• TW-1 probe was equipped with 13 scientific instruments to conduct exploration of Mars by remote sensing and in-situ investigation. All scientific data of instruments have been released.



Updates of TianWen-1

• Six instruments on the ZhuRong rover.







camera



Surface composition detector

Mineral and elements



Magnetic field detector

Environment



Internal structure



Meteorology



Updates of TianWen-1

- A shallow and high precision stratified image of the structure 80 meters south of the Martian utopian plain was obtained, revealing the Martian surface transformation events related to multi-stage water activities since the late Western period (3.5-3.2 billion years ago). (Accepted by Nature.)
- The sub-meter resolution topographic data of the landing area of ZhuRong is obtained, the location of the landing site (109.925° E, 25.066° N, elevation-4099.4m) was accurately located, and the geomorphology and geological background characteristics of the landing area were revealed. (Published in Nature Astronomy in January 2022.)
- The mechanical parameters such as soil cohesion and bearing strength of the landing area were obtained, and the surface physical properties of the landing area were revealed. (Published in Nature Geoscience in March 2022.)
- The discovery of recent signs of water activity in the southern inspection area of the Martian utopian plain revealed that the Martian hydrosphere in the late Amazon period (700 million years) was more active than traditionally believed. (Published in Science Advances in May 2022.)











Ongoing Program

In the end of 2021, the 4th phase of CLEP and PEC were approved by Chinese government, which was scheduled to be implemented before 2030.





CE-6 Mission Brief

Objective

To return samples from South Pole Aitken Basin on far side of the Moon.





Schedule

To be launched in May 2024 by CZ-5.

Configuration

▲ 北京空间飞行器总体设计部 Ⅲ── Institute of Spacecraft System Engineering, CAST An orbiter, a return capsule, a lander and an ascent vehicle.

CE-7 Mission Brief



A new lunar telecom relay satellite, QueQiao-2 was launched in Mar. 2024.

Objective

To conduct detailed investigation of resources and environment on lunar south pole.

Configuration

A new orbiter, a lander, a rover and a hopper.







To be launched in about 2026 by CZ-5

Landing site

Above 88°S near south pole





CE-8 Mission Brief

Configuration

A new propulsion module, lander, rover and hopper.

Objective

To conduct the feasibility of lunar resource utilization, and build the basic model of Lunar Research Station.





Schedule

To be launched no early than 2028 by CZ-5.



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After implementation of the 4th phase of CLEP, the next step will be ILRS. ILRS is an international scientific program, which is dedicated to gain a number of technology innovations and significant scientific discoveries, to promote utilization of lunar resources, and to set a new benchmark of international cooperation in space exploration.

ILRS Prospect



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TianWen-2 Mission Brief



than 2025 by CZ-3B.



TianWen-3 Mission Brief



Configuration

An orbiter with a return capsule, a cruise stage with a Mars lander and a Mar ascent vehicle.



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TianWen-4 Mission Brief



中国航天 Institute of Spacecraft System Engineering, CAST

Objective

To conduct exploration of Gas giant planets and their moons.





Configuration

A Jovian probe and an interplanetary probe for Uranus fly.

To be implemented no early than 2029 by CZ-5.



End

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