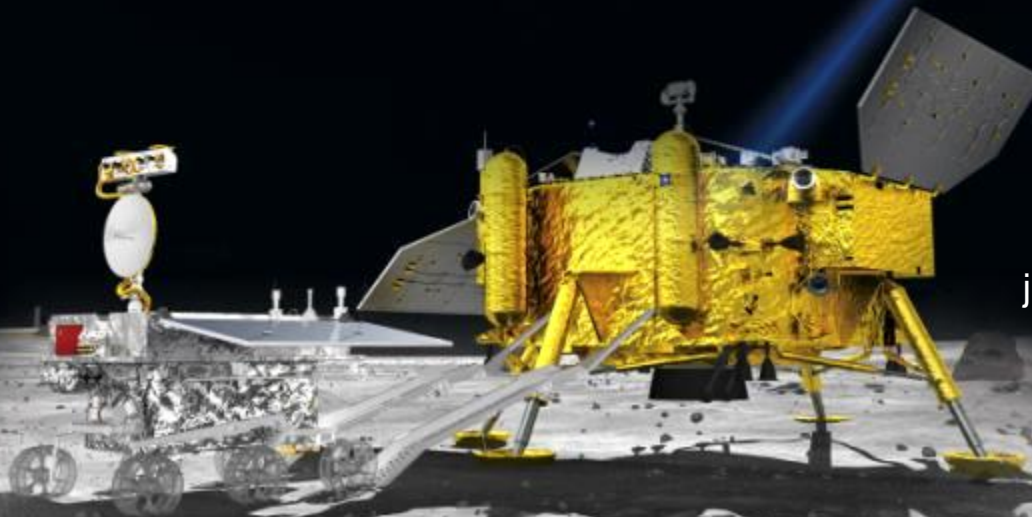


# China's Space Exploration: Cooperation and Potential Development



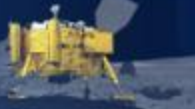
国家航天局  
China National Space Administration



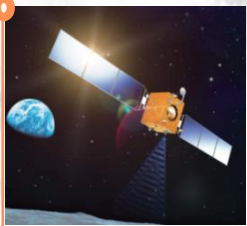
JIANG HUI  
jiangh@cnsa.gov.cn



# China Lunar Exploration Program (CLEP)

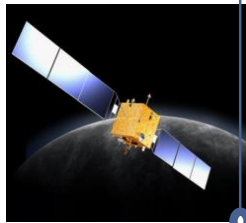


## Step1: Orbiting

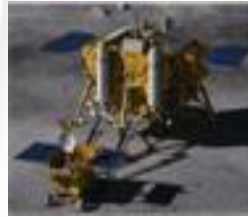


Chang'e-1  
2007.10

Chang'e-2  
2010.10



## Step2: Landing

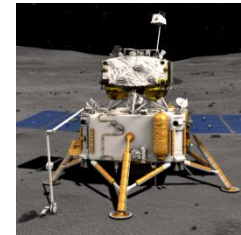


Chang'e-3  
2013.12

Chang'e-4  
2018



## Step3: Sample return



Chang'e-5  
before 2020

The first mission of  
CLEP Step IV

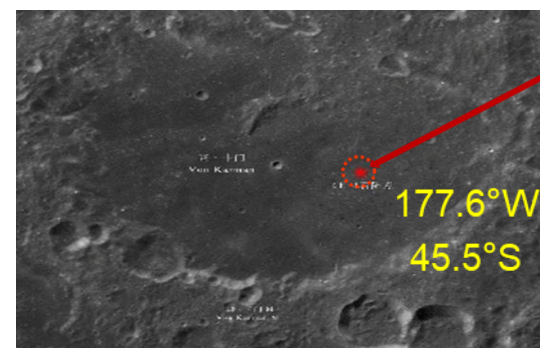
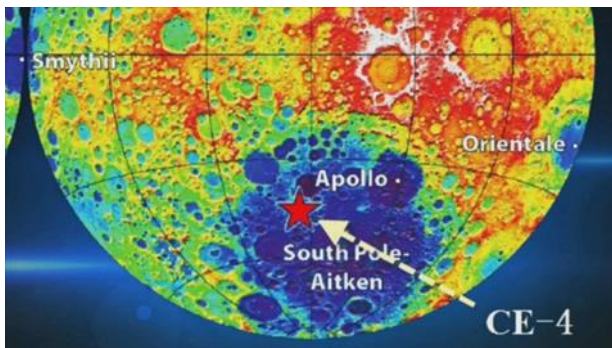
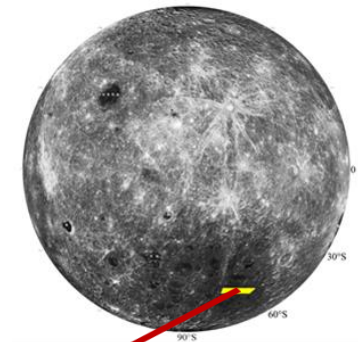
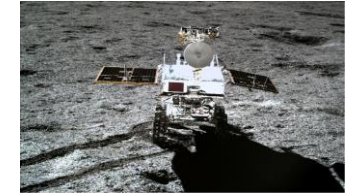
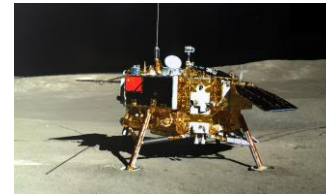
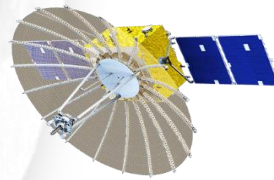


# Chang'e-4 mission

Chang'e-4 mission: Queqiao Relay satellite and lander, Yutu 2 rover.

## Engineering Objectives:

- Realize the first TT&C and relay communication at the Earth-Moon L2 Point.
- Realize the first soft landing on the lunar far side and perform exploration.

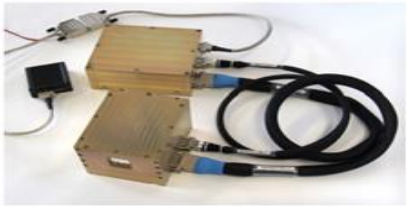
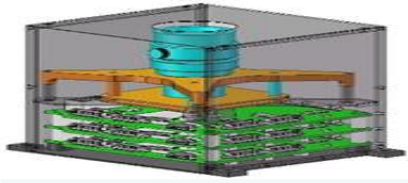
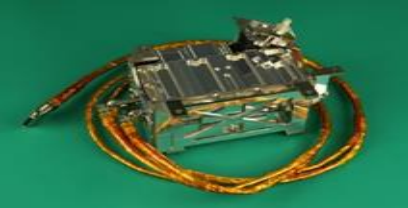







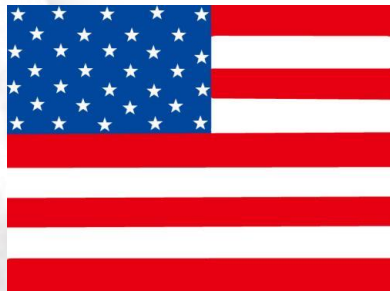
# Chang'e-4 mission

## Four international payloads

Countries	Payloads	Remark
Germany		<b>Lander Neutrons and Dosimetry:</b> Gather radiation dosimetry for future human exploration of the Moon, and will contribute to solar wind studies
Saudi Arabia		<b>Micro optical camera:</b> Shooting a lunar image of the visible spectrum
Sweden		<b>Neutral atom detector:</b> Performing astrophysical studies in the unexplored radio regime of 80 kilohertz to 80 megahertz
Netherlands		<b>Low frequency explorer:</b> Performing astrophysical studies in the unexplored radio regime of 80 kilohertz to 80 megahertz



# Chang'e-4 mission



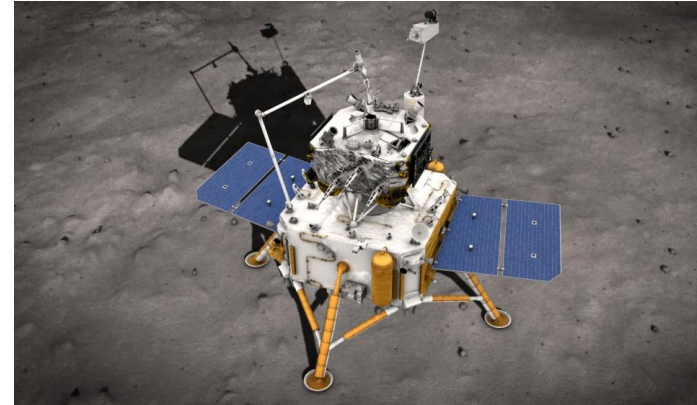
Sweden

沙特阿拉伯



## Chang'E-5 Mission

- ❑ Autonomous lunar sampling and return to the Earth.
- ❑ Launched by Long March 5 rocket at Wenchang Satellite Launch Center in 2019.
- ❑ Study topography and geological structure, mineral composition, regolith thickness and structure.



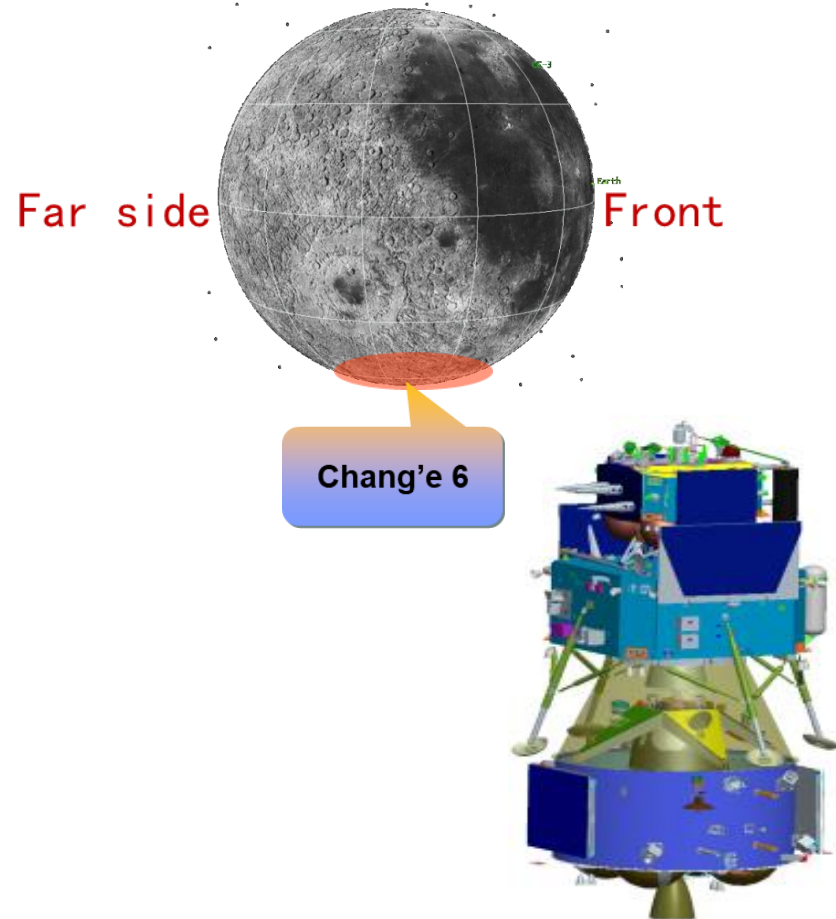


# China Deep Space Exploration



## Chang'-6 Mission

- ❑ Launched in 2020.
- ❑ Piggyback opportunity: 20kg  
(Lander: 10kg; Rover:10kg)



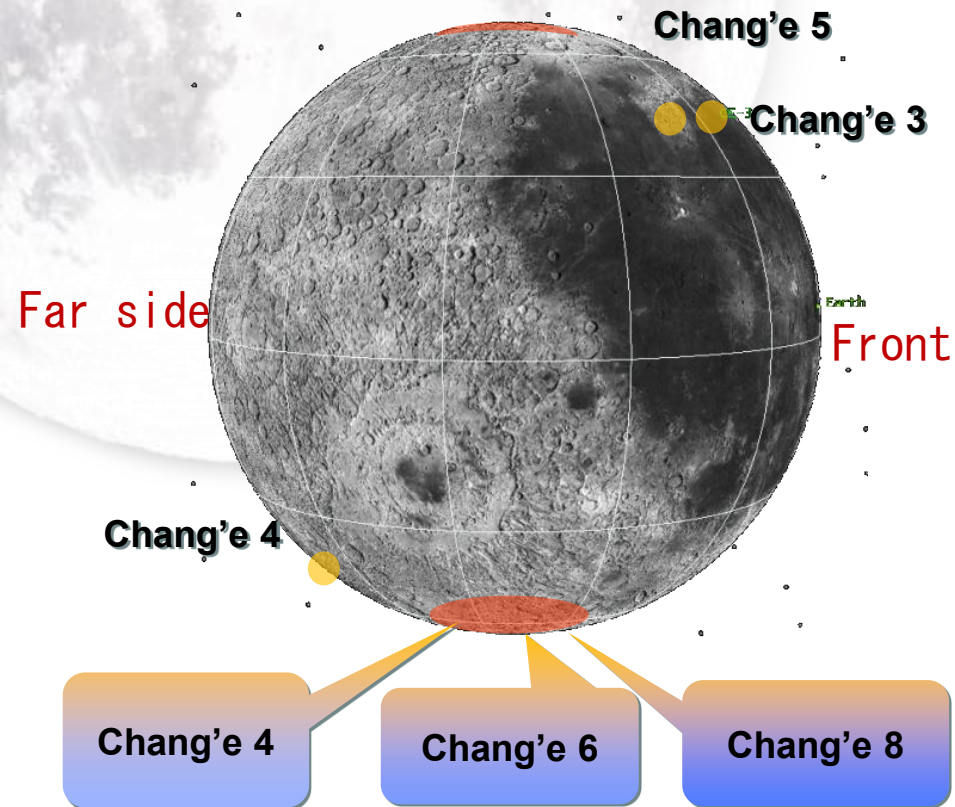




# Future lunar mission



## Lunar south pole region missions



**Chang'E-7:** Conduct a comprehensive survey on the moon's **south pole** to detect the topography, material composition and space environment of the moon.

**Chang'E-8:** In addition to continuing scientific testing, some **key technical verifications** will be carried out.

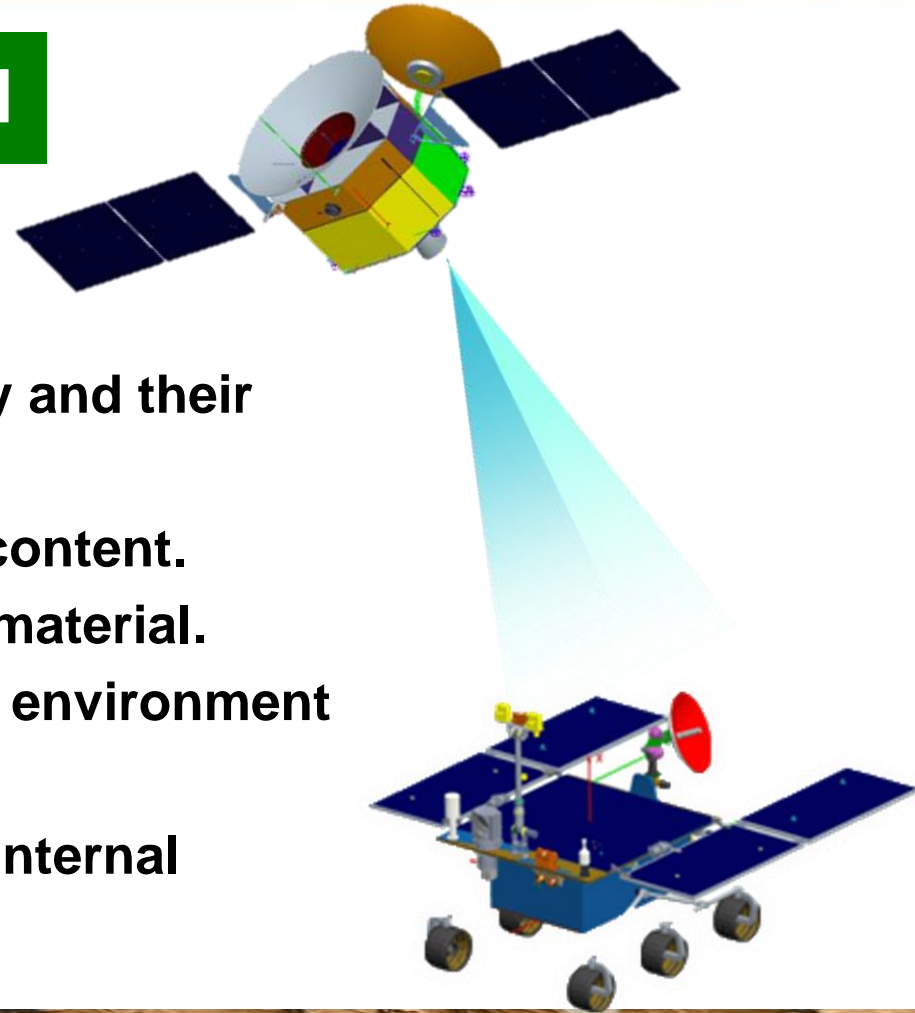
**2 to 3 missions are under planned finished before 2030.**



# Deep Space Exploration Roadmap

## First Mars Mission HX-1

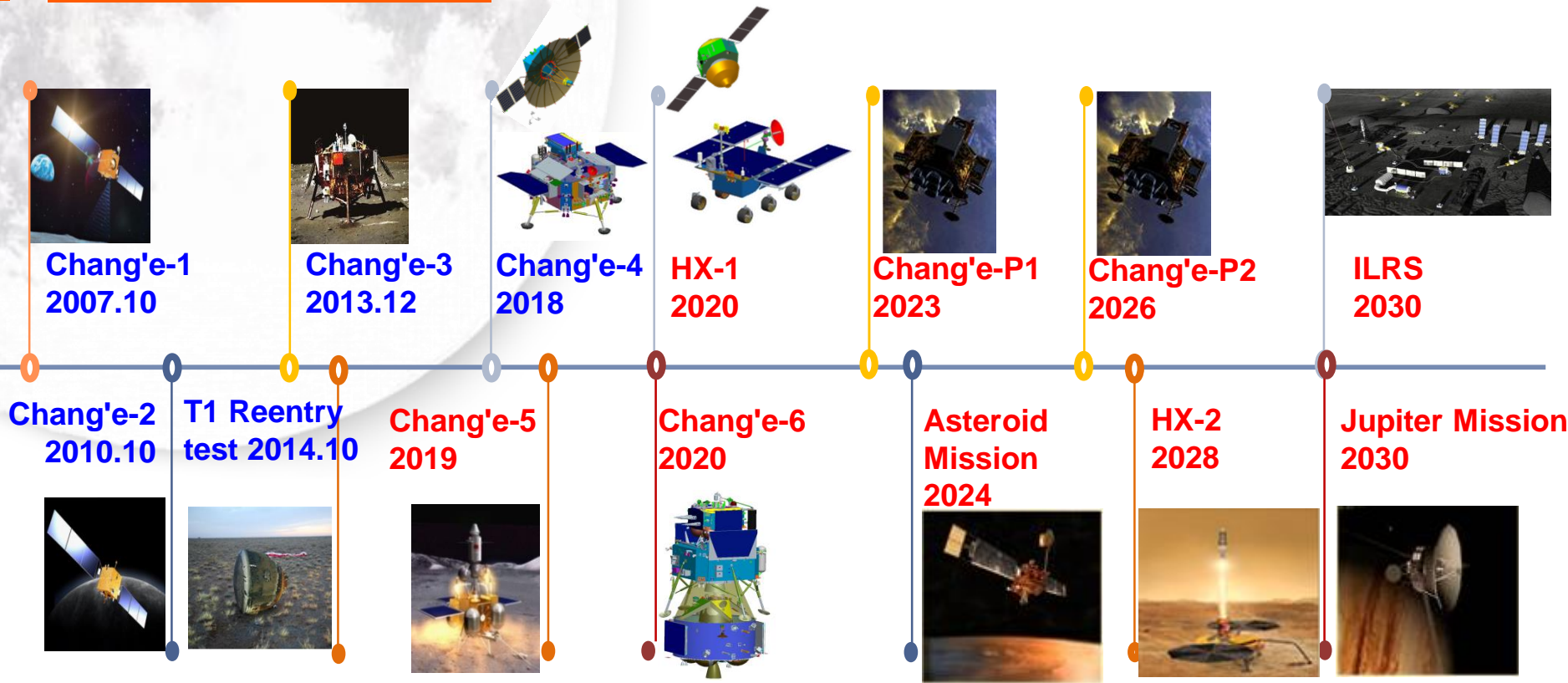
- ❑ To be launched in 2020.
- ❑ Scientific Objective
  - Feature topography and geology and their variations;
  - Characterize soil and water-ice content.
  - The composition of the surface material.
  - Martian ionosphere, climate and environment feature.
  - The Martian physical fields and internal structure.





# China Deep Space Exploration

## Roadmap



A composite image showing a lunar lander and rover on the moon's surface. The lander is gold-colored with a large antenna and solar panels. The rover is silver with six wheels and a camera. The Earth is visible in the upper left corner, and a blue beam of light from the lander illuminates the scene. The background is a starry space.

Thank you !