

Progress of Chinese Lunar Exploration Program



China National Space Administration

2015. 2

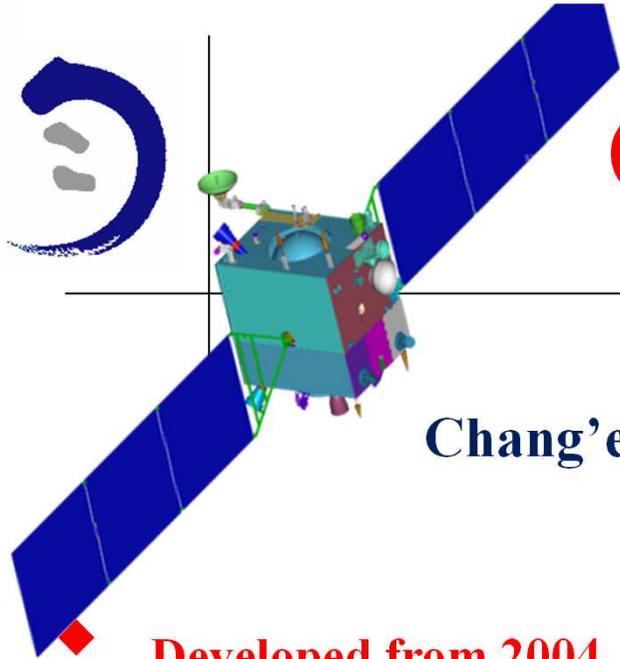


Chinese Lunar Exploration



“Three-step” strategy

- ▶ “Orbital missions” 2004~2007 (1st phase)
- ▶ “Soft lander/rover” 2008~2013 (2nd phase)
- ▶ “Sample return” 2011~2017 (3rd phase)



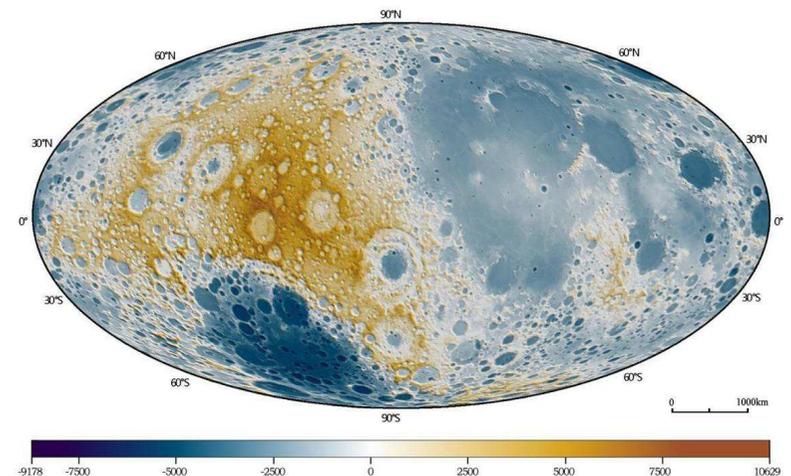
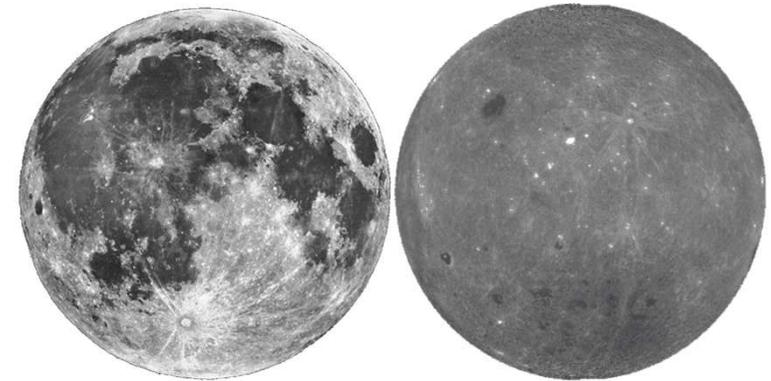
Orbital missions



1st phase

Chang'e I Mission(CE-1)

- ◆ **Developed from 2004**
- ◆ **On Oct. 24th, 2007, successfully launched.**
The on-orbit time was for 1 and a half years, got the whole picture of the moon.
- ◆ **On March 1st, 2009, It was controlled to crash on the Moon after 494 days of orbital operation .**

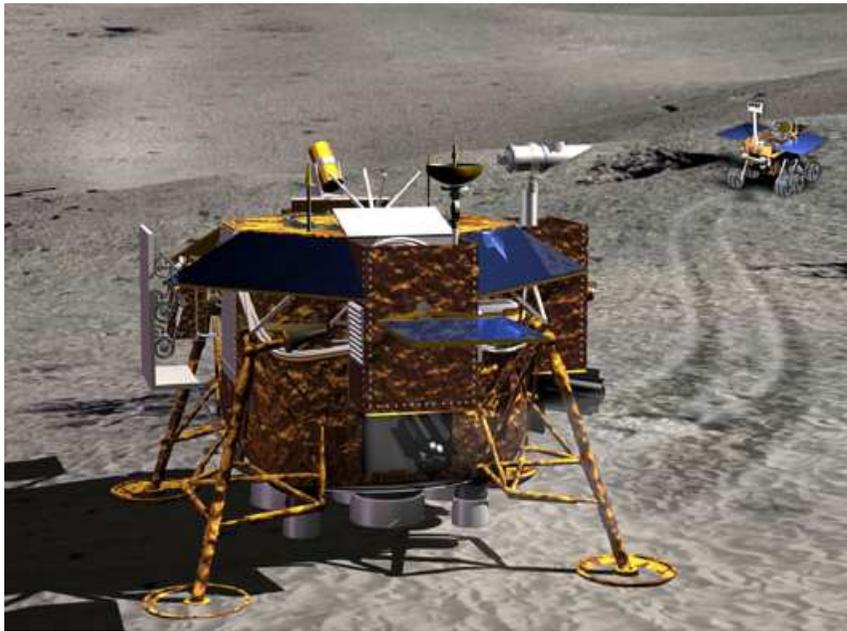




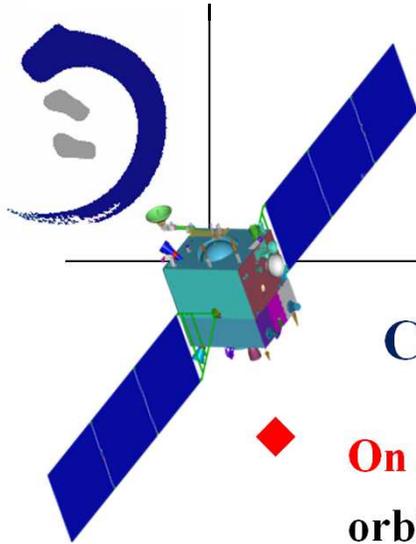
Soft lander/rover



2nd Phase



- ◆ Began at 2008.
- ◆ Lunar soft landing and automatic surface roving exploration.



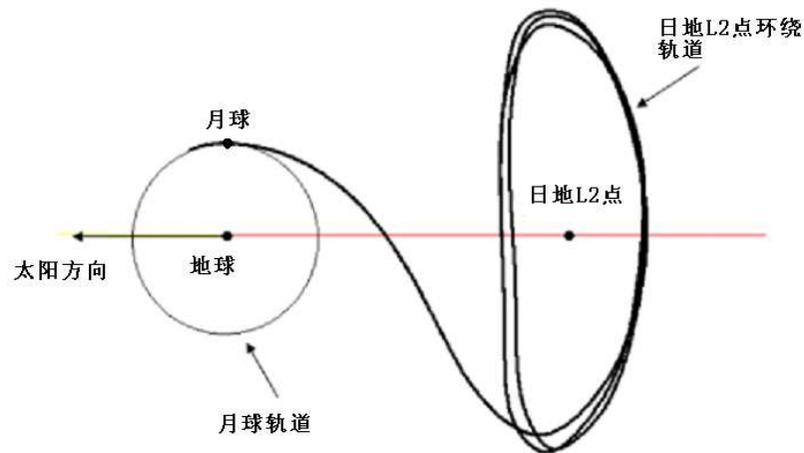
Soft lander/rover

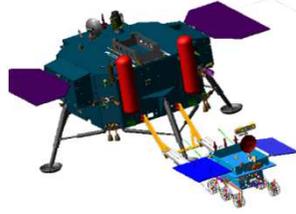


2nd phase

Chang'e II Mission(CE-2)

- ◆ **On June 9, 2011**, CE-2 headed to Sun-Earth L2 point from lunar orbit, It arrived at there on **August 25** and surrounded L2 point for 10 months for scientific exploration.
- ◆ **On December 13, 2012**, It successfully flew by asteroid Toutatis.
- ◆ Chang'e 2 has flown for 4 years on orbit. Now it has become an artificial satellite of the sun.





Soft lander/rover



2nd phase

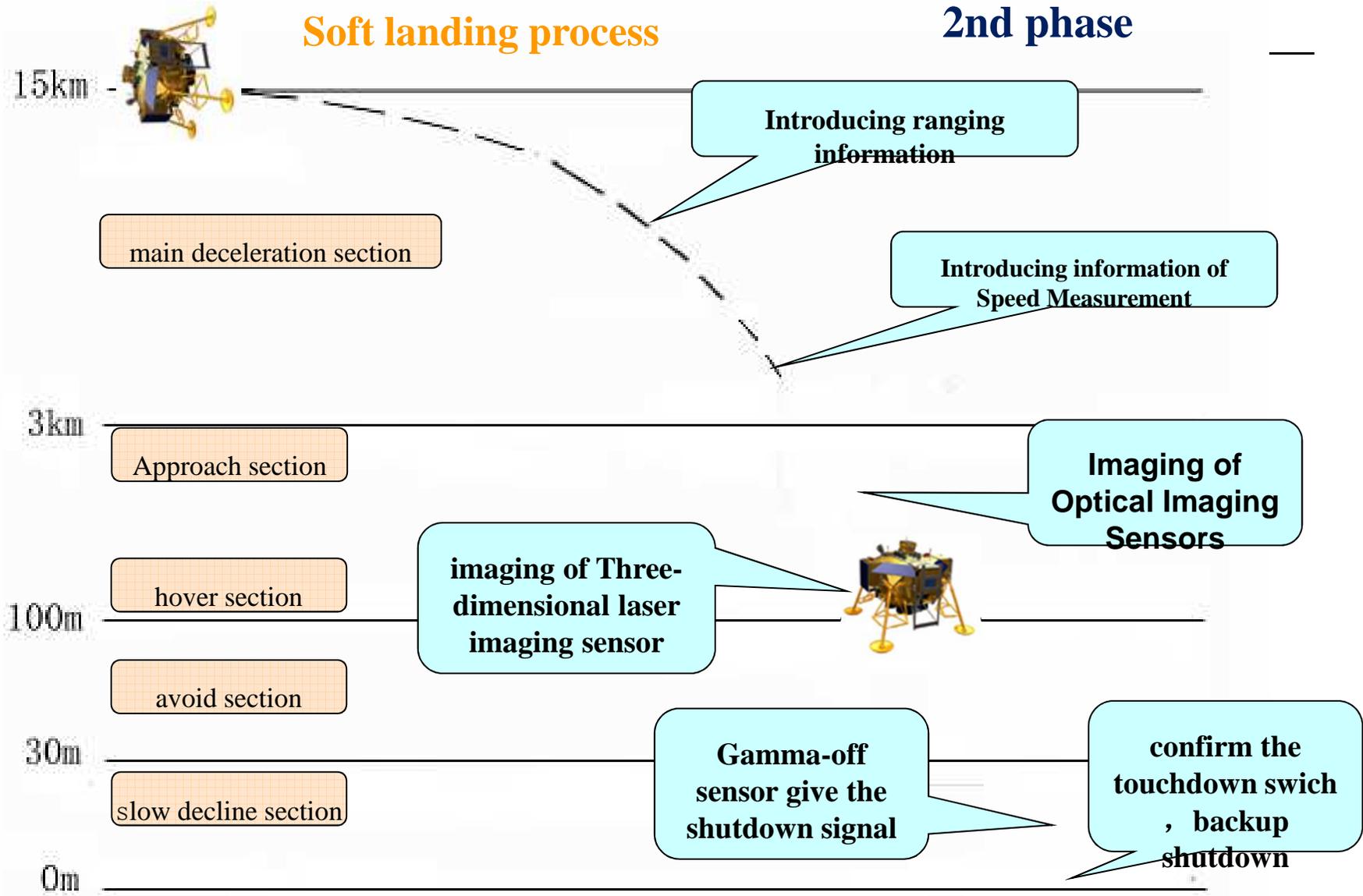
Chang'e III Mission(CE-3)

- ◆ Developed from **2008**. Lander and Rover
- ◆ **On December 2nd, 2012**, It was successfully launched
- ◆ **On December 10th**, It was powered descent from Moon orbit

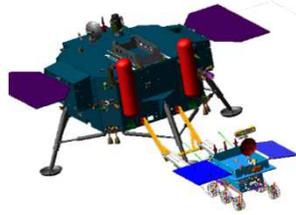




Soft lander/rover



Soft landing process continued for 11min



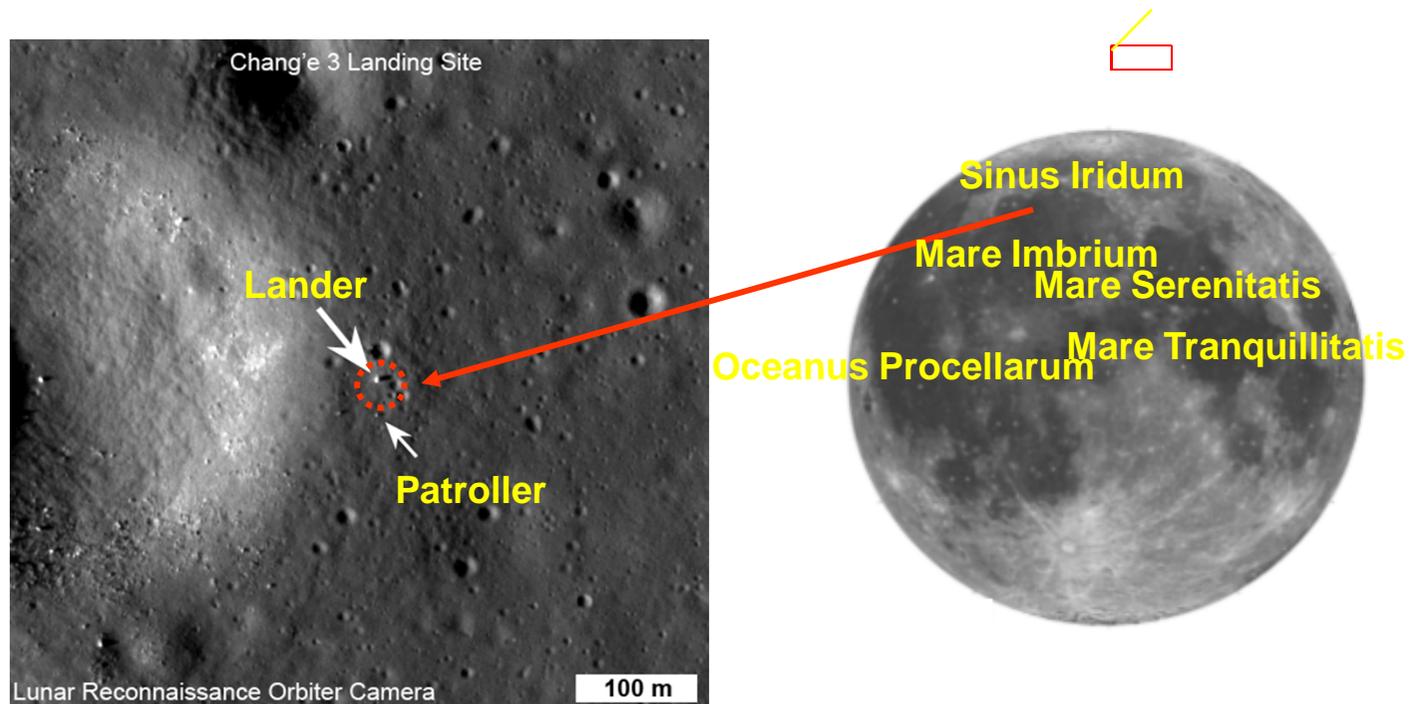
Soft lander/rover

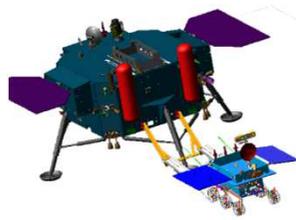


2nd phase

Chang'e III Mission(CE-3)

On December 14th, 2013 , Chang'e 3 landed in the Northwest region of Mare Imbrium, 44.12° N, 19.51° W





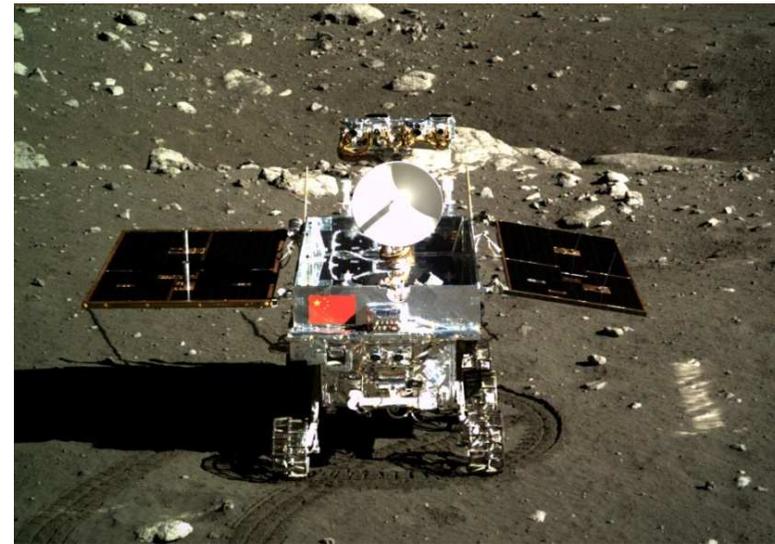
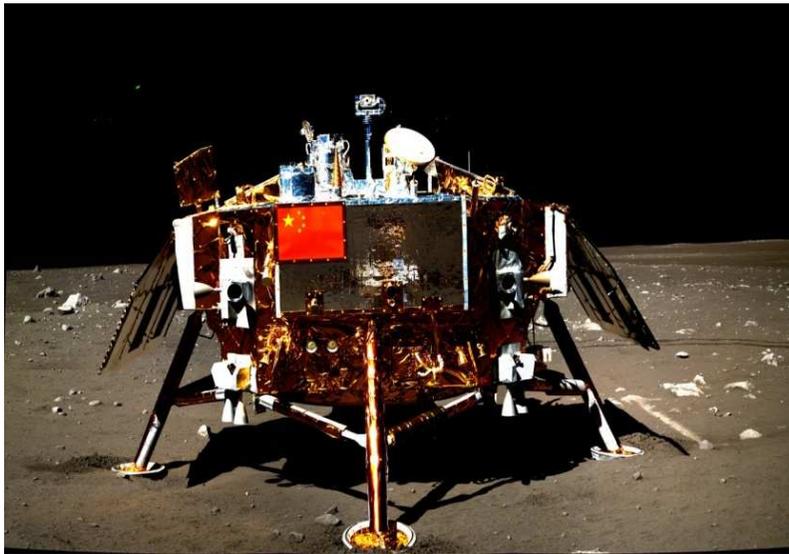
Soft lander/rover

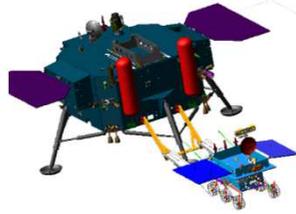


2nd phase

Chang'e III Mission(CE-3)

On December 15th, 2013, the Lander and the rover took photos for each other, the mission of Chang'e 3 were successfully completed.





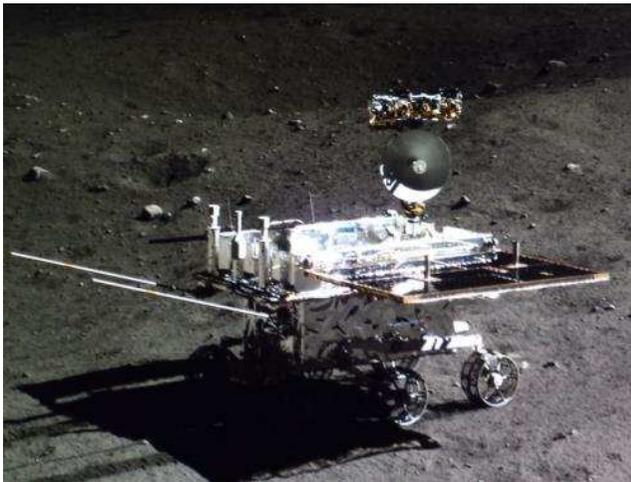
Soft lander/rover

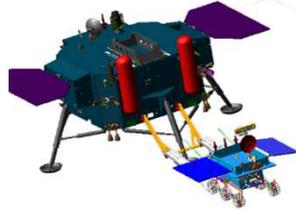


2nd phase

Chang'e III Mission(CE-3)

- **In May 2014**, since entered the six Moonnight, the Rover's capability had been gradually cut down.
- **The Lander has been working properly. It has lived through 1year lifetime and has expansion tests ongoing.**





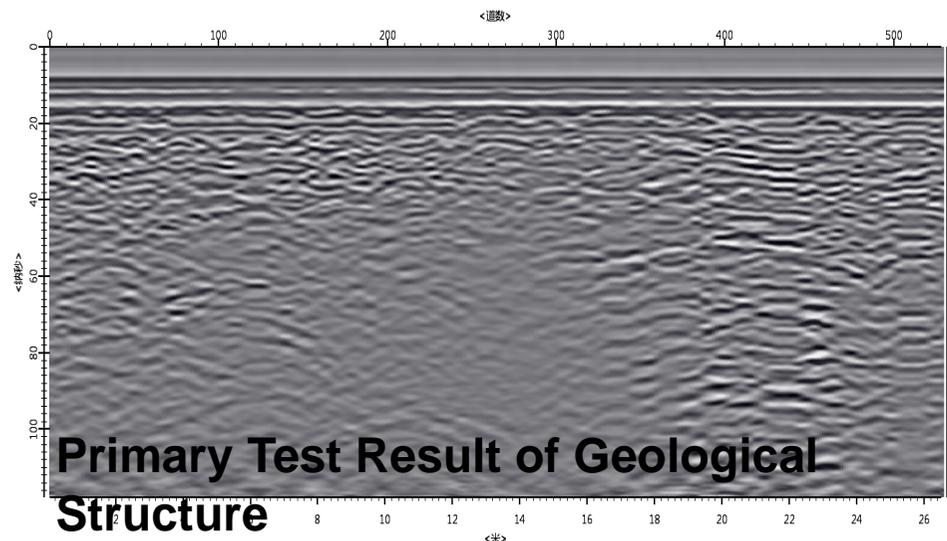
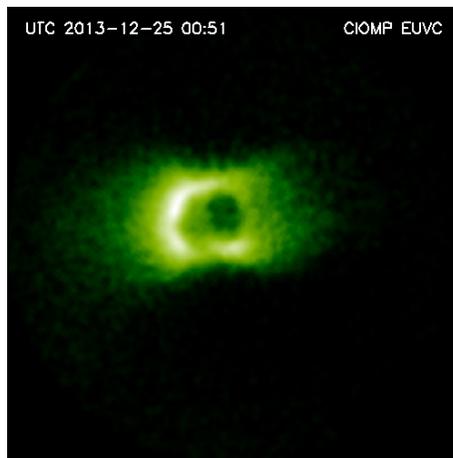
Soft lander/rover



2nd phase

Chang'e III Mission(CE-3)

It has experienced 13 lunar days and nights, and survived from the twice Lunar eclipse. All of the 8 kinds of onboard payloads get on the scientific exploration according to the plan. It has gotten the scientific data about 3000GB. It makes some progress on Earth plasma layer monitoring, Lunar base astronomical observation and sectional structure of the Lunar crust shallow detection.

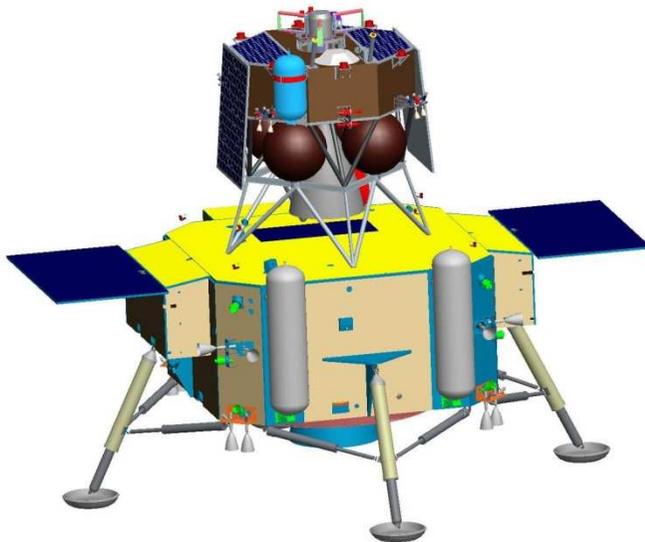




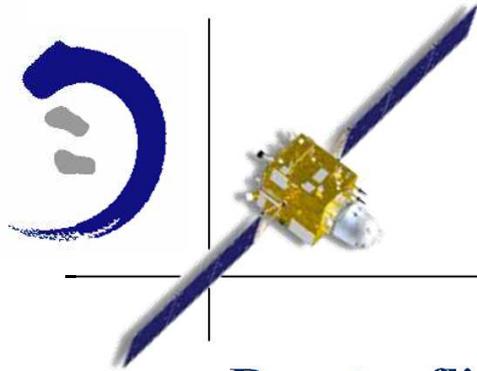
Sample Return



3rd phase



- ◆ Developed from **2011**
- ◆ To achieve Lunar surface automatic sampling and return, analysis in laboratory on Earth.



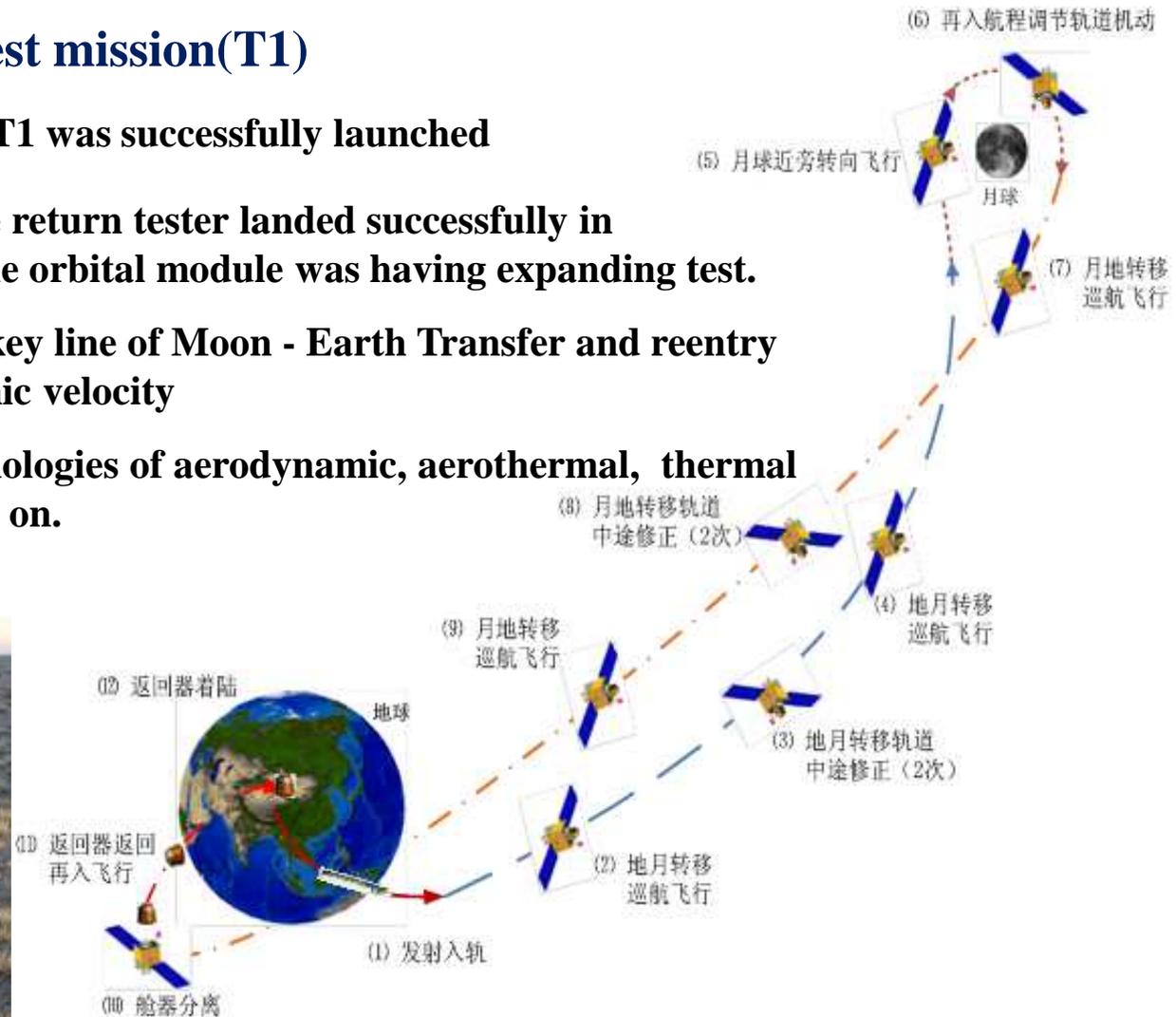
Sample Return

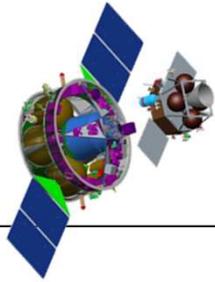
3rd phase



Reentry flight test mission(T1)

- ◆ **On October 24, 2014,** T1 was successfully launched
- ◆ **On November 1st,** The return tester landed successfully in predetermined area. The orbital module was having expanding test.
- ◆ T1 mission proved the key line of Moon - Earth Transfer and reentry Earth with second cosmic velocity
- ◆ It verified the key technologies of aerodynamic, aerothermal, thermal protection, GNC and so on.





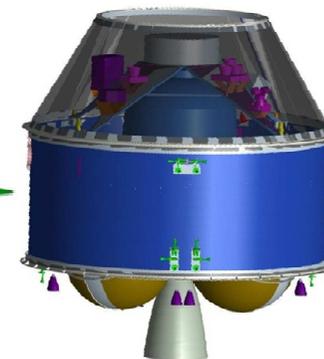
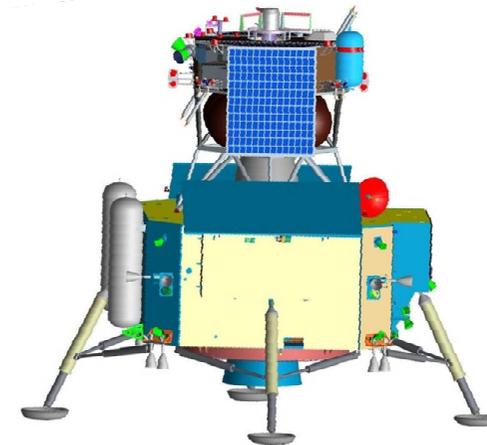
Sample Return

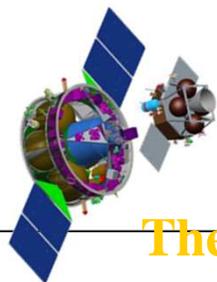
3rd phase



Chang'e V Mission(CE-5)

- ◆ The Detector Composition: Orbiter, Lander, Riser, Returner
- ◆ **In December, 2012**, project went into initial manufacture stage
- ◆ Now, detector system is having the development and test of the identification products. It will transfer to flying products developing stage in the 2nd half of 2015
- ◆ Chang'e 5 is plan to launch in around **2017**



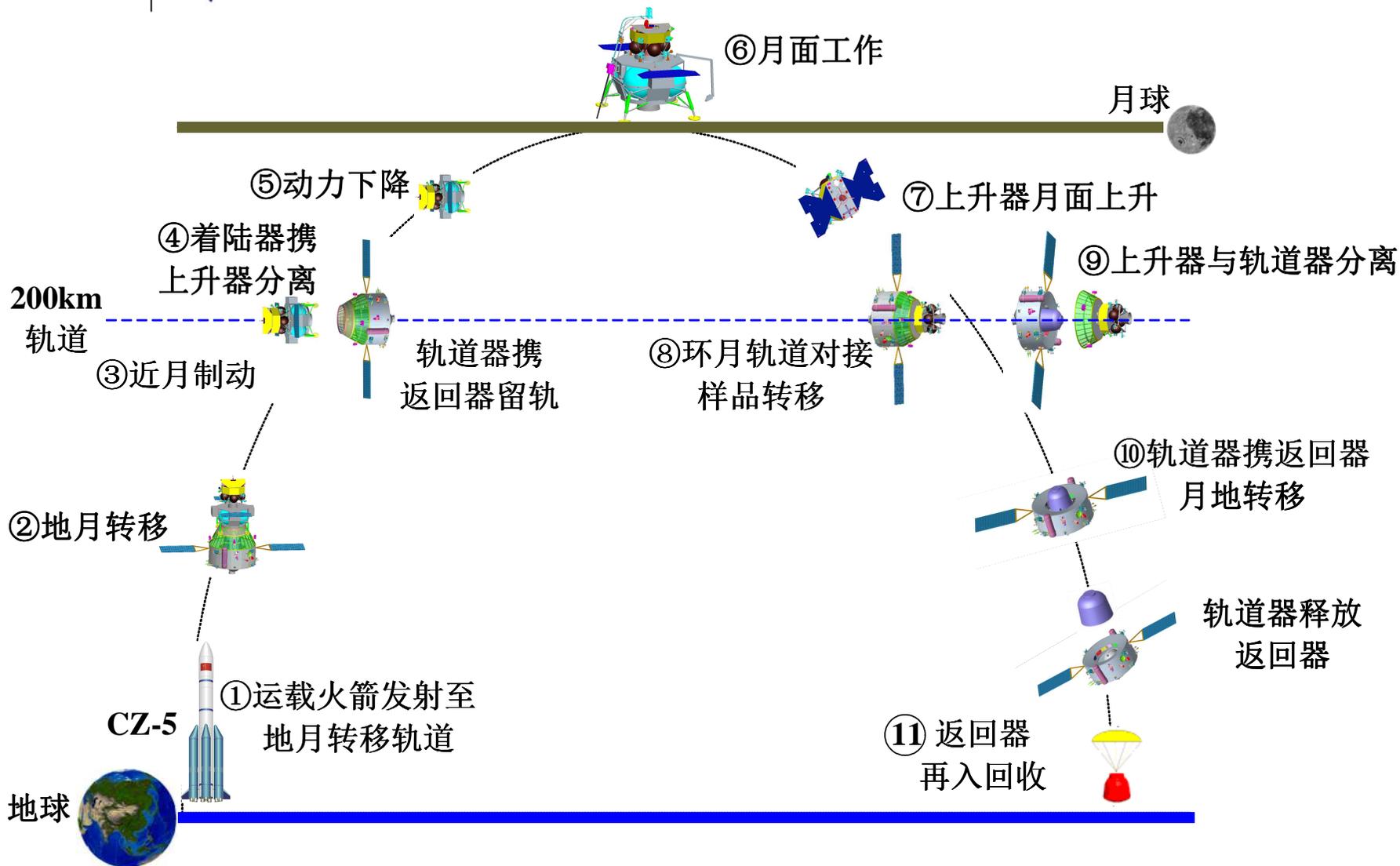


Sample Return



The whole flying process of Chang'e V

3rd phase

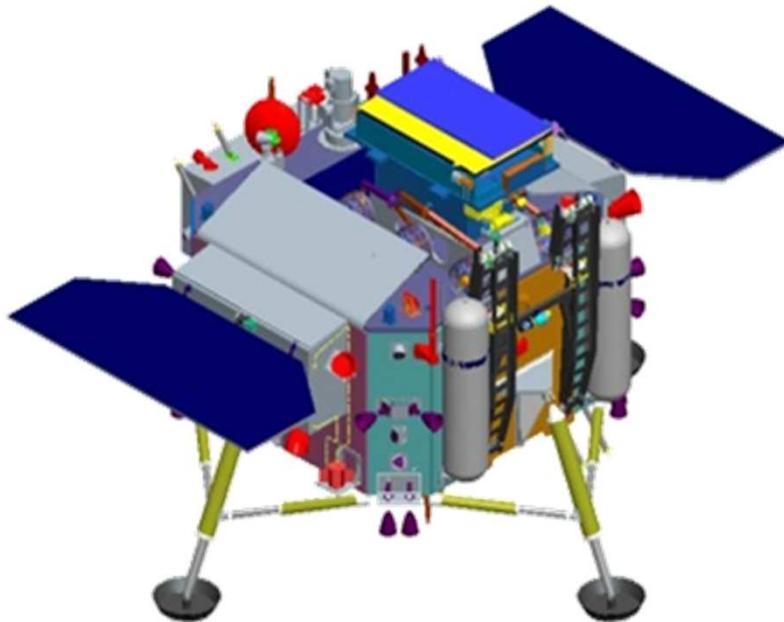




Chinese Lunar Exploration



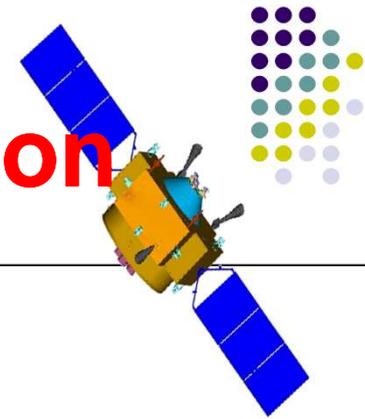
Chang'e IV(CE-4)



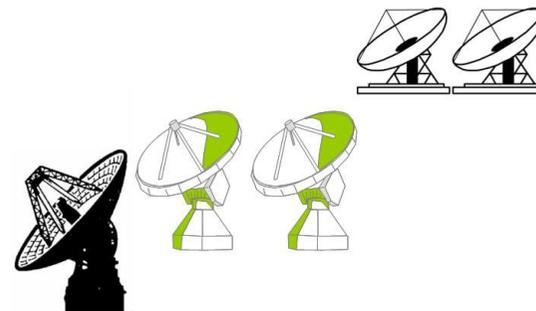
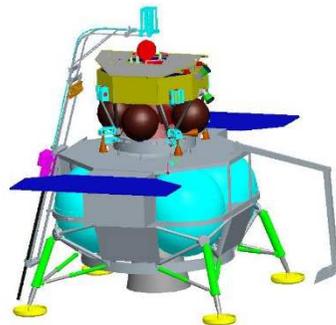
- ◆ **Chang'e 4 is being carried on deepen argument and proposed technical improvements to develop lunar or other aster exploration now.**
- ◆ **Welcome foreign institutions to take part in the development and exploration missions.**



Chinese Lunar Exploration



By implementing Chang'e Lunar exploration program, China has basically mastered the technologies of deep space exploration, Such as soft landing on extraterrestrial objects, surface exploration, roving, sampling and reentry. The initial program systems had been constructed for deep space exploration including big rocket, landing and return probe, deep space TT & C network, the ground scientific data receiving system.





Chinese Lunar Exploration



In the process of Chang'e program implementation, We got the support of friendly countries and organizations. Welcome cooperation to participate China's lunar and deep space exploration in future. The cooperation of us will promote the rapid development of human space science, and promote common progress of mankind.



China will timely propose a new lunar exploration mission or other deep space exploration projects.



Thanks for your concern and support for China's lunar exploration!

China's lunar and deep space exploration needs sincere cooperation of your countries!

