Progress of Chinese Lunar Exploration Program

China National Space Administration

2015. 2
“Three-step” strategy

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

Lunar soft landing and automatic surface roving exploration.
Chang’e II Mission (CE-2)

- Developed from 2008, Orbiting Exploration mission, To verify the key technologies of the soft landing, and search for landing site of CE-3.
- October 24th, 2010, CE-2 was successfully launched. It got 7m resolution map of full moon, and 1.5m resolution image of local area.
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.
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

2nd phase

Introducing ranging information

Introducing information of Speed Measurement

Imaging of Optical Imaging Sensors

imaging of Three-dimensional laser imaging sensor

Gamma-off sensor give the shutdown signal

confirm the touchdown switch, backup shutdown

Soft landing process continued for 11min
On December 14th, 2013, Chang’e 3 landed in the Northwest region of Mare Imbrium, 44.12° N, 19.51° W
On December 15th, 2013, the Lander and the rover took photos for each other, the mission of Chang’e 3 were successfully completed.
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 1 year lifetime and has expansion tests ongoing.
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.
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.
Chang'e V Mission (CE-5)

- **The Detector Composition**: Orbiter, Lander, Riser, Returner
- **In December, 2012**, the 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

①运载火箭发射至地月转移轨道
②地月转移
③近月制动
④着陆器携上升器分离
⑤动力下降
⑥月面工作
⑦上升器月面上升
⑧环月轨道对接样品转移
⑨上升器与轨道器分离
⑩轨道器携返回器月地转移
⑪返回器再入回收
Chang’e IV (CE-4)

- Chang’e 4 is being carried on to 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.
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.
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!