

## Chapter 2

### Status in China

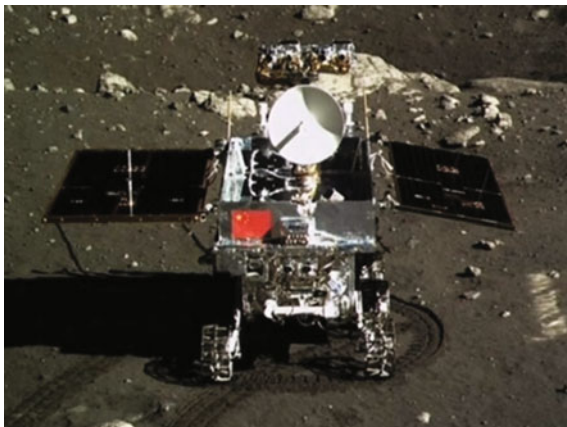
After 50 years of development, China has laid a certain foundation in space technology and space science research, also making great progress in discipline development, research team and infrastructure construction. Chinese space science has a great growing trend, along with its complete disciplines, growing research team and emerging scientific results.

**With respect to policies**, the State Council published a white paper *China's Space Activities in 2011* in December of that year, specifying purposes and principles of China's space industry development: to explore outer space and to enhance understanding of the Earth and the cosmos; to utilize the outer space for peaceful purposes, to promote human civilization and social progress, and to benefit the whole of mankind; to meet the demands of economic development, scientific and technological development, national security and social progress; and to improve the scientific and cultural knowledge of the Chinese people, to protect national rights and interests, and to build up its national comprehensive strength. China's space industry development is subject to and serves the overall national development strategy, and adheres to the principle of scientific, independent, peaceful, innovative, and open development.

**With respect to manned space engineering**, “Tiangong-1” target spacecraft and “Shenzhou-8” spacecraft were successively launched in September and November 2011, which made China's first Rendezvous and Docking (RVD) test a success, and laid a solid foundation for follow-up construction of the space lab and space station. In June 2012, “Shenzhou-9” spacecraft, carrying male astronauts Jing Haipeng, Liu Wang, and female astronaut Liu Yang, carried out RVD with “Tiangong-1” successfully, which was the first manned space RVD test in China. In June 2013, manned by male astronauts Nie Haisheng, Zhang Xiaoguang, and female astronaut Wang Yaping, “Shenzhou-10” spacecraft was successfully launched by LM-2F rocket. A lecture was given by Chinese astronauts in space for the first time. The spacecraft returned to the Earth safely after a 15-day in-orbit flight.

**With respect to the lunar exploration program**, China successfully launched “Chang'e-2” lunar probe in October 2010, which acquired higher-resolution images

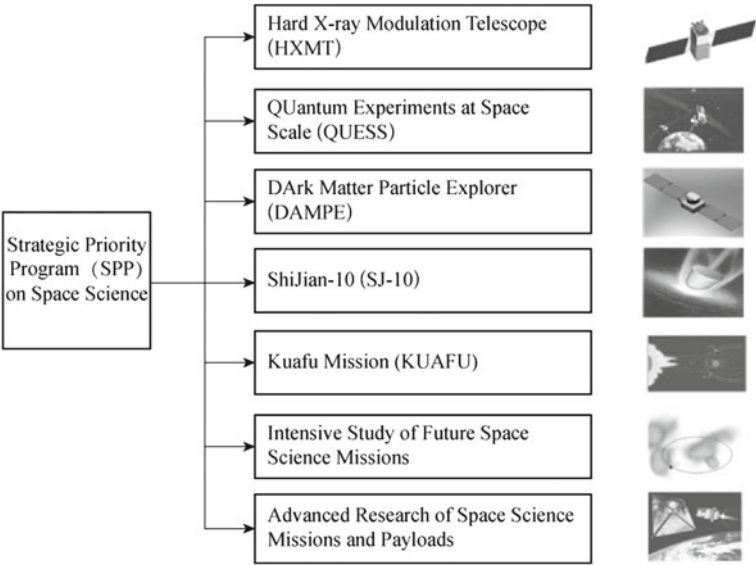
**Fig. 2.1** The lander and the rover of “Chang’e-3” take photos of each other successfully. *Credit China National Space Administration*



of the full moon and the Sinus Iridum. Research was done with these images on the moon's topography, geology, surface composition, microwave characteristics, near-moon space environment, etc. A number of extended experiments were carried out such as those orbiting L2, etc., which laid a foundation for the subsequent deep space missions. In December 2013, “Chang’e-3” lunar probe was successfully launched. The lunar lander and “Yutu” rover, performed soft-landing and lunar surface patrol. Besides, the lander and the rover took photos of each other (Fig. 2.1). They performed in situ analysis of the lunar surface characteristics, topography and integrated geology of the landing and patrolling areas. The detection of the lunar surface and lunar-based astronomical observation were also carried out, fulfilling the goal of the second step of lunar exploration. In October 2014, Chang’e-5-T1, a Chinese precursor mission for the Chang’e-5 lunar sample return mission, was launched, and the successful flight validated the technology for the reentry vehicle.

**With respect to space science satellites**, the most important all-round progress in China's space science since 2010 is the start of the Strategic Priority Program (SPP) on Space Science led by CAS. In March 2010, at the 105th executive meeting, the State Council approved *2020 Innovation Plan* submitted by CAS. It requested CAS to “organize the implementation of the Strategic Priority Programs to make major innovative breakthroughs and strive for competitive advantages in various aspects”. In January 2011, at the meeting of CAS leaders, it was decided to launch the first of the Strategic Priority Programs. Thus, the SPP on Space Science entered into its formal implementation phase. The go-ahead of the Program marked that China's space science had entered a new stage.

The overall goal of SPP on Space Science is as follows: in the scientific frontiers with the greatest potentials for scientific discoveries where we have the most advantages, through both independent science missions and international cooperation, to achieve major scientific breakthroughs, then to subsequently drive the great leaps of related advanced technologies, and to enable the strategic role of space science in national development. The Program includes strategic planning of space



**Fig. 2.2** The block diagram of SPP on space science. *Credit CAS/NSSC*

science development, the research on innovative concepts and the pre-study of their related technologies, the development of key technologies concerning space science satellites, the satellites’ development, launch and operation as well as the scientific data analysis. This mainly constitutes the complete chain of a space science mission, from incubation, beforehand preparation, key technology R&D, through to engineering development and final outputs. Figure 2.2 shows the structure of SPP on Space Science.

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