

Chinese National Space Agency



CNSA's logo

The arrow in the middle is similar to the Chinese character 人 which means 'human' or 'people', to state that humans are the center of all space exploration.

The three concentric ellipses stand for three types of [Escape Velocity](#) (minimum speed needed to reach sustainable orbits, to escape the earth system, and to escape the solar system) which are milestones of space exploration. **The second ring** is drawn with a bold line, to state that China has passed the first stage of exploration (earth system) and is undergoing the second stage exploration (within the solar system).

The 人 character stands above the three rings to emphasize humanity's capability to escape and explore.

Olive branches were added to state that China's space exploration is peaceful in nature.



The “**King of Rocketry**”

Qian Xuesen / Hsue-Shen Tsien
12/11/1911 – 10/31/2009)



←ROCKET

←FIRE ARROW

These characters appeared
in 1200 AD

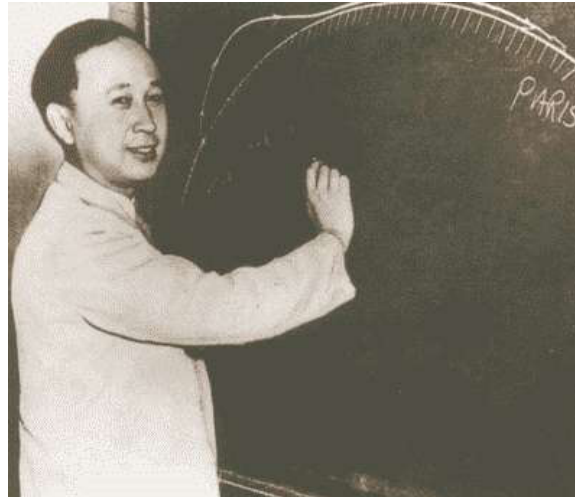
Hsue-Shen Tsien was a Chinese engineer who contributed to aerodynamic and rocket science.

In the 1930s, he was recruited from [MIT](#) to join Caltech and co-founded the Jet Propulsion Laboratory. Later he returned to China, took the name **Qian Xuesen**, and made important contributions to China's missile and space programs.

During the second “red scare” in the 1950s, the US accused him of communist sympathies. Stripped of his security clearance, and after spending five years under house arrest, Tsien was released in exchange for American pilots captured during the Korean Conflict.

He then helped lead the Chinese to China's first successful atomic bomb, making China the fifth nuclear weapons state. Additionally, Qian's work led to the development of the [Dongfeng ballistic missile](#) and the Chinese Space Program.

For his contributions, he became known as the "Father of Chinese Rocketry", nicknamed the "King of Rocketry".



How China's space program has grown

Some experts say China's improving capability in space could be a military threat to the U.S. A look at China's progress:

1950s

1956 China's first rocket research institute founded

Shenzhou 7 spacecraft launches in 2008; two astronauts perform China's first spacewalk

1960s

1964 Launches its first biological rocket; it carries four mice

1970s

1970 Becomes fifth nation to launch satellite into space; Dong Fang Hong-1 orbits Earth

1990s

1990-2002 Successfully launches four unmanned spacecraft

2000s

2003 Becomes the third nation, after Russia and U.S., to launch a human into space

2007 Without notice, China uses anti-satellite missile to shoot down one of its weather satellites; launches satellite that orbits moon

2010s

2010 Completes land-based, anti-ballistic missile test; second nation, after U.S., to destroy an incoming missile outside Earth's atmosphere

2012 Astronauts successfully dock spacecraft with orbiting test module, furthering goal to create manned space station by 2020

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Source: Sino Mania, Xinhua, New Scientist, China Daily, Agence France-Press
Graphic: Judy Treible



Time Line of Chinese Space Program up to a “man in space” (source: New Scientist)

1956: China, still an overwhelmingly poor and rural society, opens its first Missile and Rocket Research Institute.

1957: The Chinese government kicks off Mission 581, a programme aimed at launching satellites.

1960: China develops its first rocket, aided by Russian scientists. It is the first of a series of rockets, all named CZ (for *changzheng*, or “long march”).

1964: Four albino rats, four white mice and 12 tubes of biological samples are put on a T-7A-S rocket, which reaches an altitude of 70 kilometres.

1968: An institute for medical and space engineering opens in Beijing. It is charged with conducting research into human spaceflight.

1970: On 24 April, China becomes the fifth country in the world to send a satellite into orbit, as the DFH-1 is lifted into space on board a Long March rocket. The Soviet Union launched the first-ever satellite, Sputnik, in 1957.

1980: Several official newspapers carry articles and photos describing preparations for crewed space flight. But the project never materialises, apparently because of budget constraints.

1984: A new launch site opens in Xichang, in south-western China’s Sichuan province.

1988: Another launch site opens at Taiyuan in north China.

1992: As China makes crewed spaceflight its mid to long-term objective, the State Council adopts Project 921. This is as secretive as past projects and later goes by the name Shenzhou (“divine vessel”).

1993: Chinese officials visit Russia’s space programme.

1994: The CZ-2D rocket lifts off, carrying several small animals.

1995: China’s space programme suffers a setback when a CZ-2E rocket explodes after take-off from Xichang, killing at least six people on the ground.

1996: China signs an agreement for the acquisition of Russian space technology.

1997: Two Chinese men, Wu Jie and Li Jinlong, complete a year of training at Russia’s Star City and become qualified as space-flight instructors. A mission control centre opens in Beijing.

1998: The development of a Shenzhou space vessel is announced.

1999: The Shenzhou spacecraft is launched on 20 November on a CZ-2F rocket and returns to Earth after 14 orbits. It carries several kilograms of biological samples.

2000: The Shenzhou is shown to the public for the first time in Hong Kong.

2001: Shenzhou II blasts off on 9 January, carrying microbes and several small animals. The capsule returns to Earth on 16 January, touching down in the Inner Mongolia region.

2002: Shenzhou III is launched on 25 March in the presence of President Jiang Zemin. On 1 April, after orbiting the Earth 108 times, the craft returns. Shortly afterwards, Beijing announces plans for a space station. On 29 December, Shenzhou IV is sent into orbit, and returns to Earth six days later.

2003: On 15 October, Shenzhou V blasts into orbit, carrying China’s first man in space, Yang Liwei. He returns after 21 hours and 14 trips around the Earth.

China's First Satellite: 1970 – Dongfanghong I

In 1970, China became the fifth country after the Soviet Union, United States, France, and Japan to independently launch a satellite. *Dongfanghong I* was launched 13 years after [Sputnik I](#).

After this launch, **Qian Xuesen** proposed to the Chinese government that China should **develop a manned space program** and submitted a manned-space undertaking report. [Mao Zedong](#) himself signed "approved" to the report.



72 faced-polyhedron
39 in in diameter
381 lbs

Launched April 24, 1970 on Chang Zheng 1 Rocket
Orbit is 275 mi by 1271 mi
Still in orbit!

Transmitted "space readings" for 20 days

Stopped transmitting on May 14, 1970



Chairman Mao

TODAY.... China has space stations and has had taikonauts visit them in space...

Manned Missions (2003-present)

11 taikonauts; 2 women

Order	Patch	Mission	Launch	Duration	Landing	Crew	Notes
1		Shenzhou 5	15 October 2003	0 d 21 h 22 m 45 s	15 October 2003	Yang Liwei	First Chinese manned flight, 14 Earth orbits.
2		Shenzhou 6	12 October 2005	4 d 19 h 33 m	16 October 2005	Fei Junlong Nie Haisheng	Multiple days in space, 75 orbits.
3		Shenzhou 7	25 September 2008	2 d 20 h 27 m	28 September 2008	Zhai Zhigang Liu Boming Jing Haipeng	First three-person crew, first Chinese spacewalk.
4		Shenzhou 9	16 June 2012	12 d 15 h 24 m	29 June 2012	Jing Haipeng Liu Wang Liu Yang	First Chinese woman in space; first manned docking with Tiangong-1 space station, 18 June 2012, 06:07 UTC. ^[4]
5		Shenzhou 10	11 June 2013	15 d	26 June 2013	Nie Haisheng Zhang Xiaoguang Wang Yaping	Second Chinese woman in space; second manned docking with Tiangong-1 space station.
6		Shenzhou 11	17 October 2016	33 d	18 November 2016	Jing Haipeng Chen Dong	First manned docking with Tiangong-2 space station.



Yang Liwei



Fei Junlong



Nie Haisheng
(2 flights)



Zhai Zhigang



Liu Boming



Jing Haipeng
(3 flights)



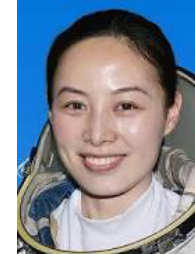
Liu Wang



Liu Yang
(1st woman)



Zhang Xiaoguang



Wang Yaping
(2nd woman)



Chen Dong

Shenzhou 9 + Tiangong-1 ---- Shenzhou 11 + Tiangong-2



China's first space station, **Tiangong-1**, is expected to fall to Earth in late 2017. It will be an uncontrolled re-entry.



Crew waving to classroom on Earth after having given a lecture on **Tiangong-1**.



Tiangong-2 is in the same 393 kilometer high orbit that China's third space station will occupy beginning in 2020. **Tiangong-1 and Tiangong-2 were not designed as permanent space stations, but as testbeds for China's third, larger space station.** That permanent station will have a configuration reminiscent of Russia's Mir space station.

October 18, 2016

Shenzhou 11 docks with Tiangong-2

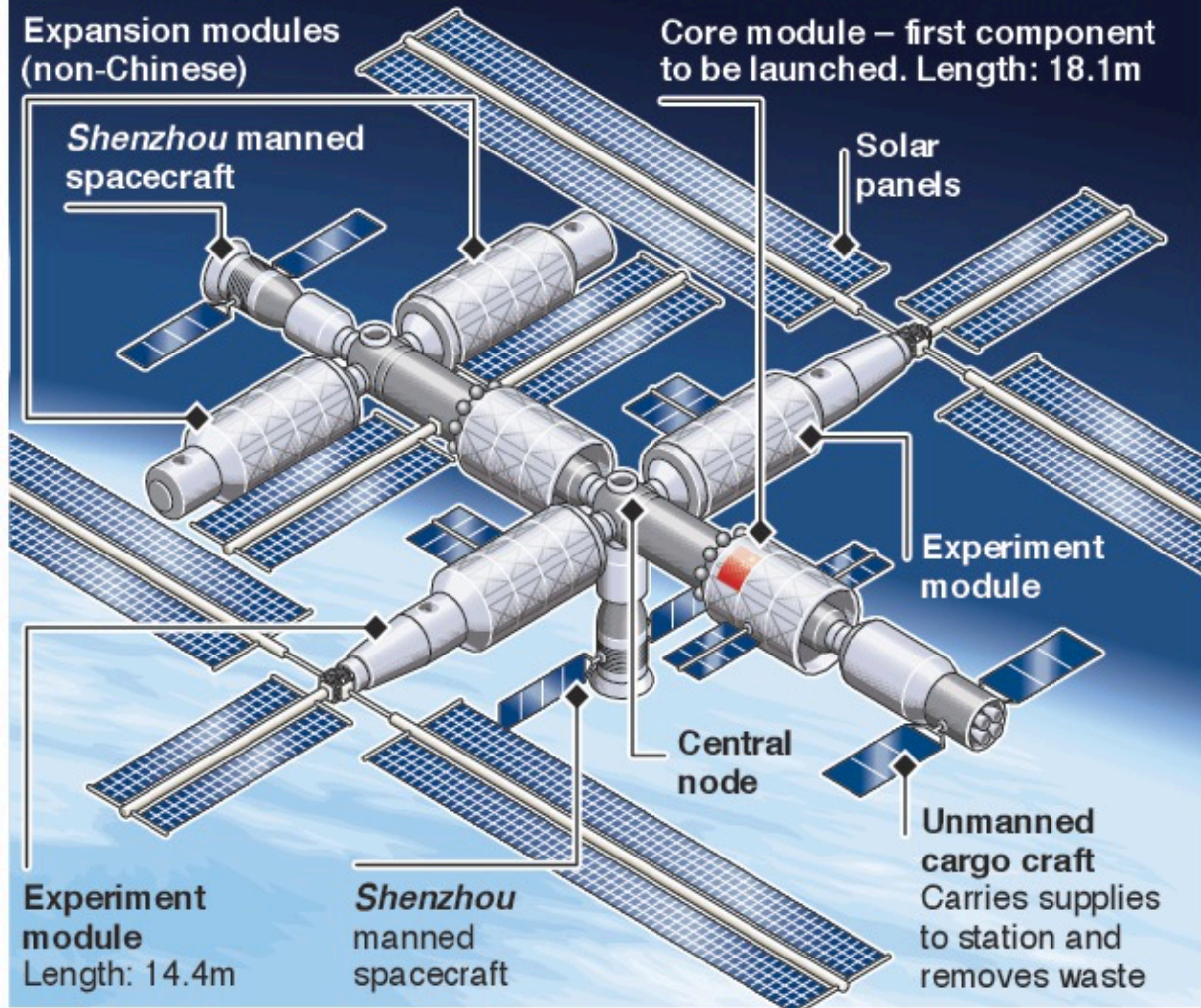


Jing Haipeng and Chen Dong entered **Tiangong-2** for a one-month mission. In Spring 2017 an automated cargo vehicle will resupply **Tiangong-2** in advance of future astronaut visits.



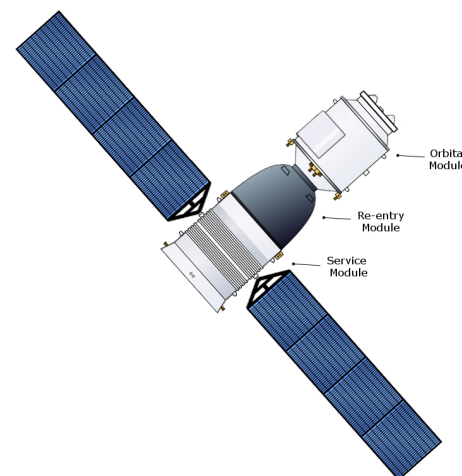
China planning launch of first space station

China's national space agency is forging ahead with ambitious plans to launch a manned space station by 2023. The orbiting outpost will support up to six crew and provide room for international modules

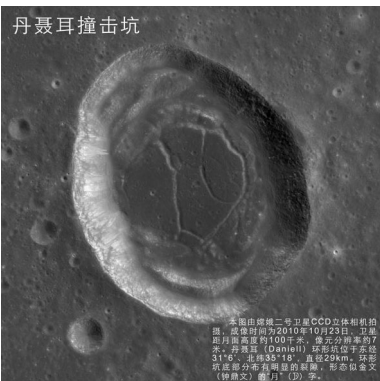


Tiangong-3: the space station

International Space Station (ISS)	Chinese space station	Mir space station (Russia)
Weight: 420 tonnes	90 tonnes	130 tonnes
Maximum length: 109m	37m	31m
Operational lifetime: 1998-2020/2028	2023-	1986-2001



China's Lunar Program



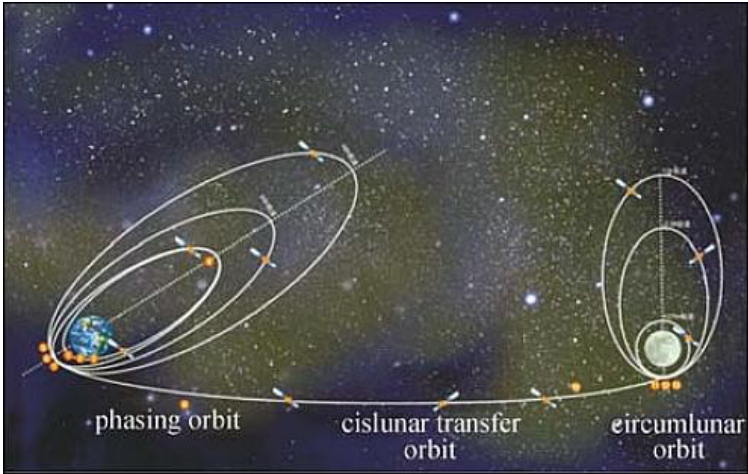
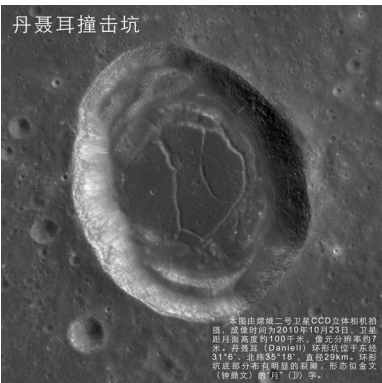
Phase I: Orbital missions: Entailed the launch of two orbiters. **Is complete.**

- **Chang'e 1**, launched 24 October 2007
- Mapped the entire Moon in high-definition 3D to provide a reference for future soft landings.
- On 1 March 2009, **Chang'e 1** crashed onto the surface of the Moon, ending its mission.

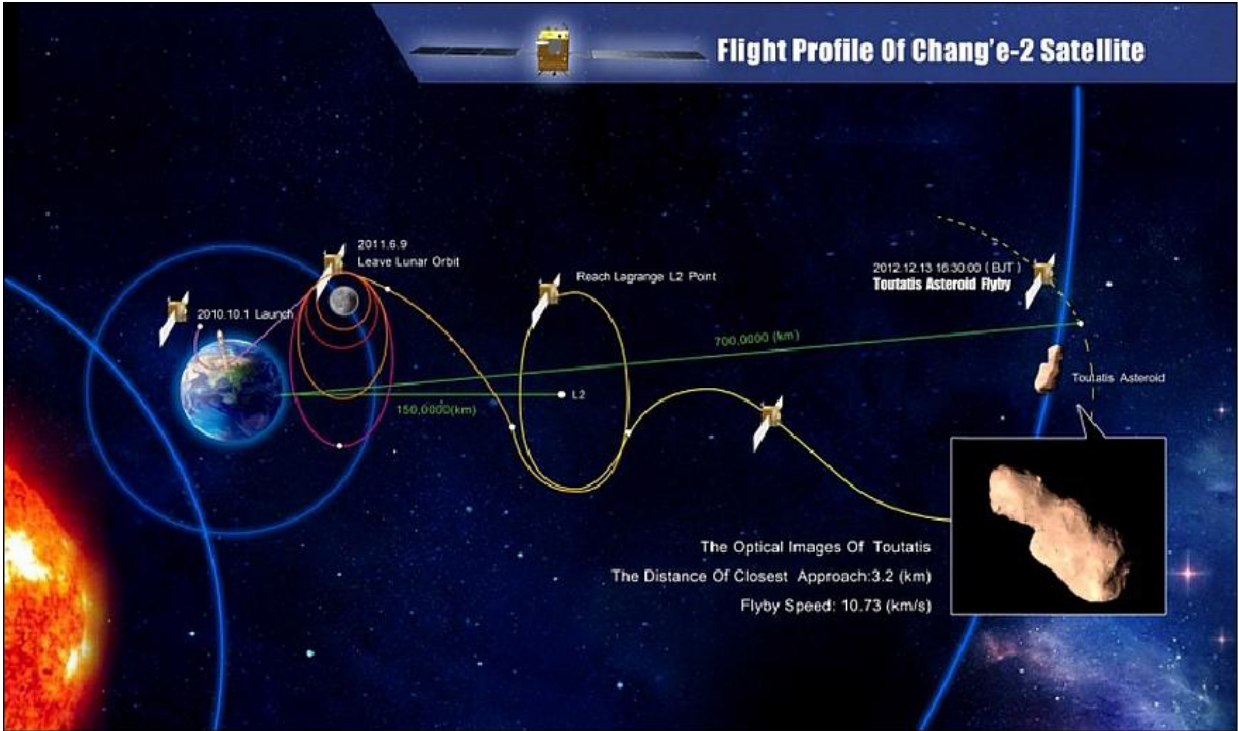


- **Chang'e 2**, launched on 1 October 2010
- Arrived in lunar orbit within 4 days and 16 hours.
- Lowered its orbit to 62 miles, with a perilune of 9.3 miles.
- After three successful breaking burns, entered its working orbit on 9 October 2010
- On 8 November 2010, the Chinese government announced the success of all mission objectives.
- In February 2012, the Chinese government released a complete lunar map with resolution of 4.3 ft!
- On 8 June 2011, entered into Sun-L2 Mission to test deep space communication network.
- It is some 300 million miles away from Earth and will return to Earth's vicinity in 2029.

China's Lunar Program



Flight Profile: Cheng'e 1



Flight Profile: Cheng'e 2 and flyby of Toutatis

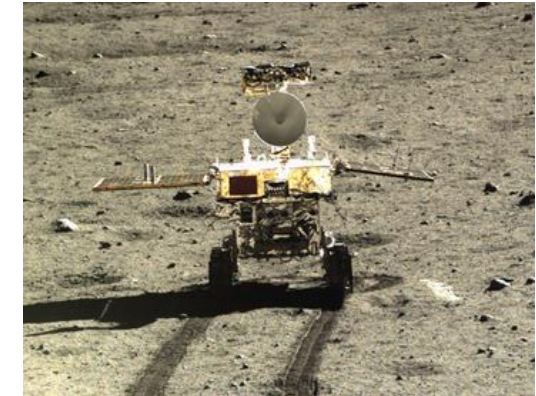
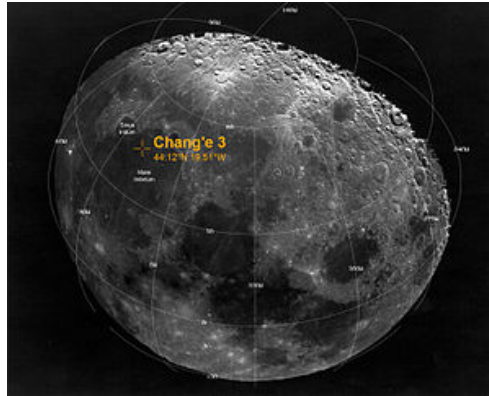


China's Lunar Program

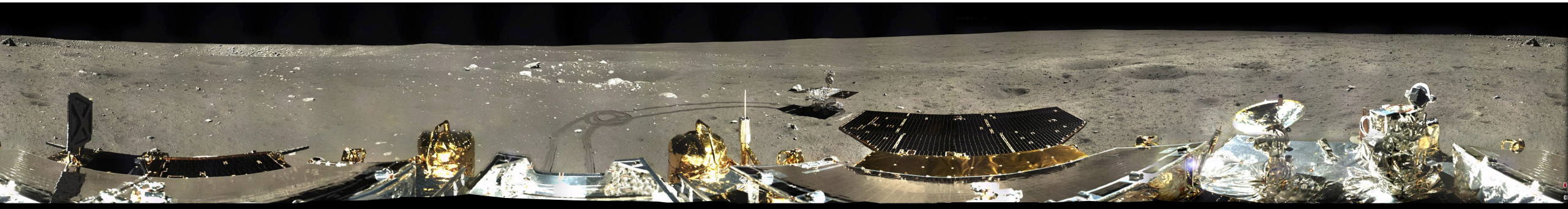


Phase II: Soft landers/rovers: The second phase is ongoing, and involves soft-landing spacecraft and rovers, **Cheng'e 3** and **Yutu**, and **Cheng'e 4**.

- **Chang'e 3** launched on 2 December 2013, landed on the Moon 14 December 2013. It carried a 310 lb lunar rover named **Yutu**, which was designed to explore an area of 1.2 sq miles during a 3-month mission. It was also supposed to conduct ultra-violet observations of galaxies, active galactic nuclei, variable stars, binaries, novae, and quasars.



(left). The landing sight on the moon. (center) **Chang'e 3**. (right) The **Yutu** rover “**Jade Rabbit**” had operational difficulties after the first 14-day lunar night (after a month on the Moon), and was unable to move after the end of the second lunar night, though it continued to gather useful information for some months afterward. On 31 July 2016, **Yutu** ceased to operate after a total of 31 months.

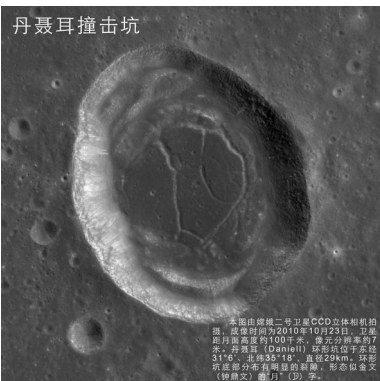


China's Lunar Program

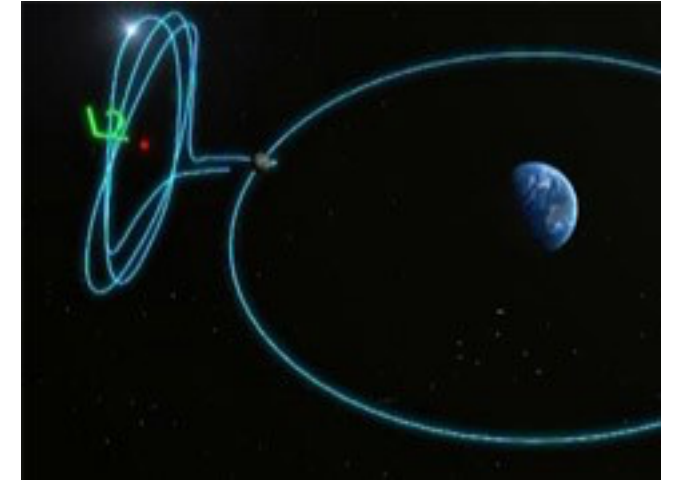


中国探月
CLEP

丹聂耳撞击坑



Cheng'e 4 (Phase II) will now be launched by the end of 2018, re-purposed to land on the **far side of the Moon**. CNSA will first launch a communication relay satellite to Earth-Moon L2 point in June 2018 as a communication relay station to relay the signals between the lander/rover and the earth station. **The mission uses private investment from individuals and enterprises for the first time. The purpose is accelerate aerospace innovation, cut production costs, and promote military-civilian relationships within China.**

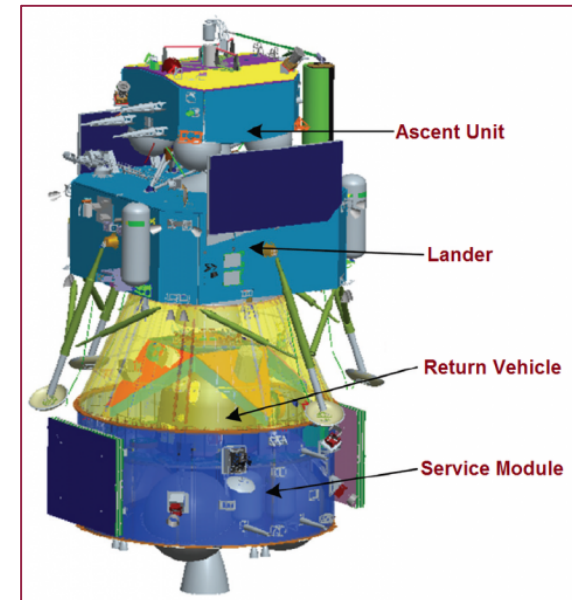


Phase III: Sample return: This final phase will entail a lunar sample return mission.

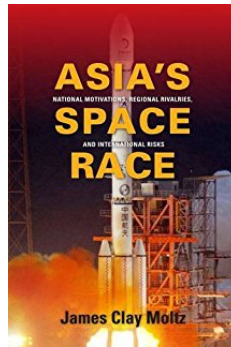
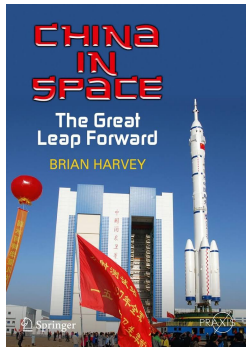
- **Chang'e 5-T1** was launched on 23 October 2014. It was designed to test the lunar return spacecraft.
- **Chang'e 5**, expected to launch in 2017 aboard a **Long March 5** rocket, will build on the success of the previous missions, with a lander capable of collecting up to 4.4 lbs of lunar samples and returning them to the Earth.
- **Chang'e 6**, expected to launch in 2020 aboard a **Long March 5** rocket, will build on the success of the **Chang'e 5** mission.

• **Phase IV: Man on the Moon in 2036**

Chang'e 5 spacecraft



“You will see the Chinese quite visibly begin to match the capacity of the other spacefaring powers by 2020,” predicts Brian Harvey, space analyst and author of [*China in Space: The Great Leap Forward*](#). Key to this will be the large manned space station, Tiangong, which they plan to have in orbit by then. Although not as physically large as the International Space Station America, Russia, Europe, Japan and other countries have been building and using since 1998, China’s space station will have a broadly similar capacity to perform science.



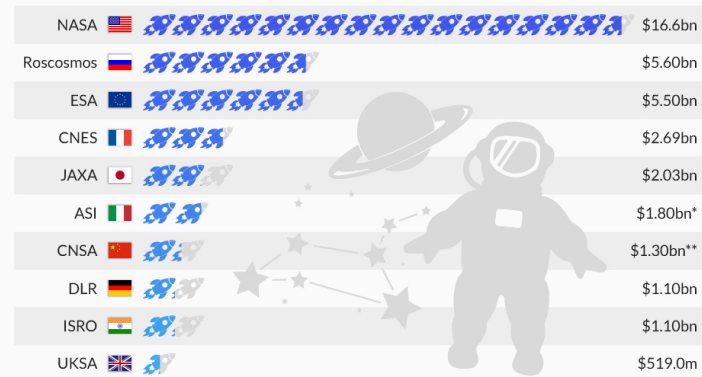
China is estimated to spend around \$6bn a year on its space programme. Although that is almost \$1bn more than Russia, it is still a fraction of the US space budget, which is around \$40bn a year. Despite its large budget, the US made only 19 successful space launches in 2013, compared with China’s 14 and Russia’s 31. With numbers like this, it is clear that China has arrived in space, and is set to become stronger.

So do the Chinese want to take over space? Brian Harvey, believes the Chinese simply want to be seen as equals. “To use a Chinese phrase, I think they are wanting to bring their own mat to the table,” he says. “They are looking for equality, they want respect from the world’s space community.”



The World Trails NASA in Space Exploration Expenditure

Annual budgets of international space agencies in 2013



*2014
**estimate
@StatistaCharts Sources: Respective space agencies

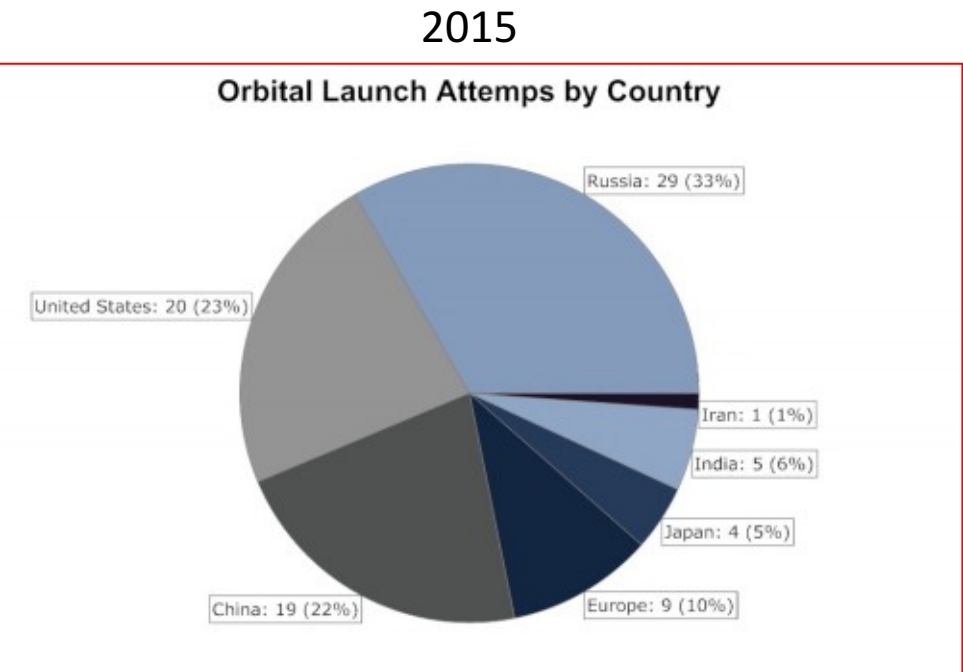
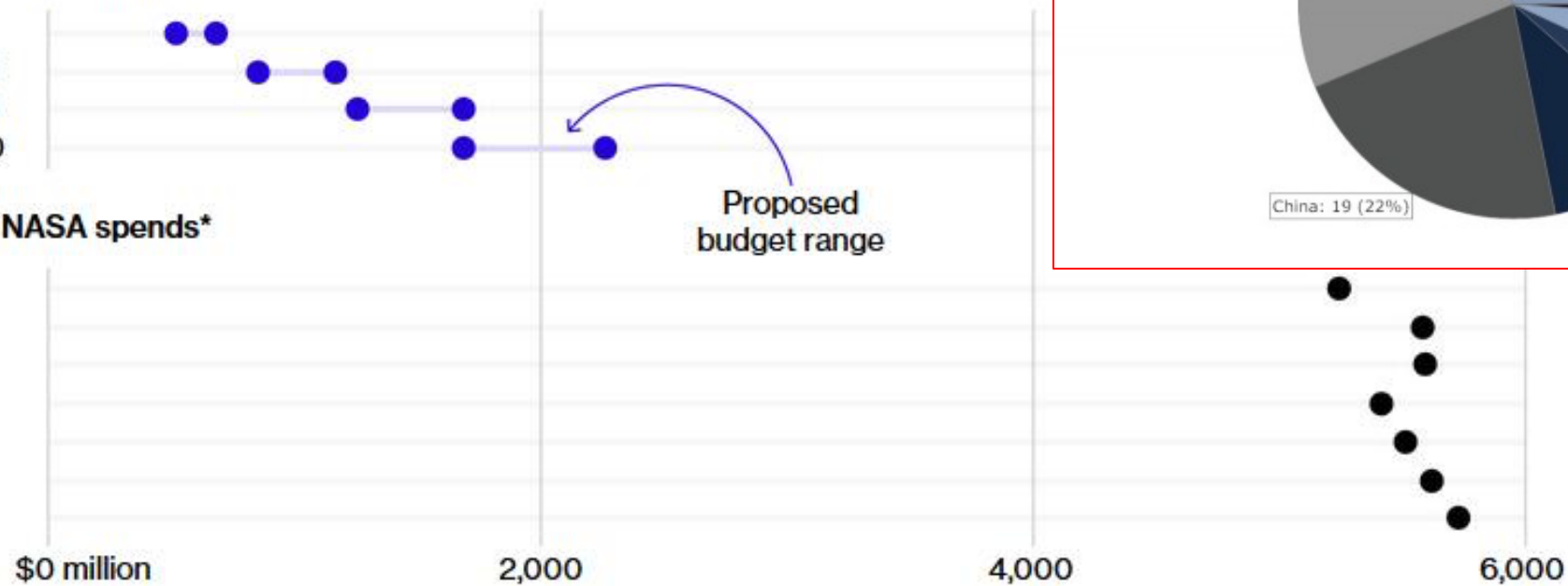
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How much China spends

2011-2015
2016-2020
2021-2025
2026-2030

How much NASA spends*

2015
2016
2017
2018
2019
2020
2021



* Fiscal years 2018-2021 are estimates