Real story on reel
Documentary shows how ethnic village in Yunnan changed its destiny LIFE, PAGE 17

Growth impetus spurs local development
BUSINESS, PAGE 13

No letup in conflict
China vows to protect its citizens as fighting in Sudan rages on
WORLD, PAGE 12

CHINA DAILY

香港版
HONG KONG

MONDAY, April 24, 2023 中国日報 www.chinadailyhk.com HK $10

Chang'e 8 to test use of 3D printing tech to build on moon

By ZHAO LEI
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Chinese scientists plan to use the Chang'e 8 lunar mission to explore the feasibility of using 3D printing technology to construct buildings on the moon, according to the chief planner of the country's lunar programs.

Wu Weiren, an academician of the Chinese Academy of Engineering and a leading scientist at the China National Space Administration, said the Chang'e 8 robotic probe — the third to be placed on the moon in the country's next lunar exploration endeavor — is set to land on the moon's South Pole to conduct on-site investigations of the environment and mineral composition at the landing site, and to check if some advanced technologies, 3D printing for example, can be done on the lunar surface using lunar materials in the future.

"If we wish to stay on the moon for a long time, we need to set up stations by using the moon's own materials," he said in a recent interview, ahead of the Space Day of China that falls on Monday.

"Lunar soil will be our raw material and it will be printed into construction units. Professors at several domestic universities, such as Tongji University in Shanghai and Xi'an Jiaotong University in Shaanxi province, have already begun studying the possible applications of 3D printing technology on the moon," he said.

China has a grand road map for exploration and development programs on our nearest celestial neighbor in the coming years, the chief planner said.

The very next step in China's lunar adventure — the Chang'e 6 robotic mission — is set to land on the moon's far side from where it will bring back soil and rock samples. Chang'e 5 has already retrieved samples from the moon's near side. "If Chang'e 6 succeeds, it will be the first time we get samples from the moon's far side," Wu said.

The Chang'e 6 probe consists of four components — an orbiter, a lander, an ascender and a reentry module — and is scheduled for launch around 2025.

The Earth's gravity creates tidal friction that slows the moon's rotation. Over time, the same face of the moon has become tidally locked, forever pointed toward the planet. This is the near side.

The other side, or the far side, has been extensively photographed from various spacecraft, starting with a Soviet probe in 1959, but no probe touched down on its surface until January 2019 when China's Chang'e 4 mission soft-landed in the Von Karman crater.

The lander and rover of Chang'e 4 have been working on the moon for more than four years and have continued to enable scientists to closely observe and conduct surveys on the far side.

After Chang'e 6, the Chang'e 7 robotic probe will be sent to land on the moon's South Pole to perform "high-precision investigations", Wu said.

See Lunar, page 3

Lunar: Chang'e 7 to complete multiple tasks

From page 1

"The Chang'e 7 mission is meant to look for traces of water on the South Pole, investigate the environment and weather there, and survey the landform. The probe will carry a 'flyby craft' tasked with flying into pits on the lunar surface to look for ice," the scientist said.

"Chang'e 7 will also be tasked with detecting the natural resources beneath the lunar South Pole's surface. Mission planners are trying to assess if we can use the probe to dig into the surface and study underground structures and their composition," he said.

In the long run, scientists will use components of the three upcoming missions — the orbiters, landers, rovers and sensors — to form the prototype of a robotic scientific outpost, which will act as a platform for international collaboration on lunar exploration, he added.

Pushing the boundaries for space exploration

SpaceX's heavy-lift launch vehicle, Starship, exploded about four minutes into its first orbital test flight last week.

The reusable rocket is designed to carry people and cargo to Earth orbit, the moon and Mars, and has a payload capacity of more than 100 tons. The Starship was the largest rocket launched by humans after the Cold War, with the strongest carrying capacity and the most innovative way of replenishment and recovery.

Despite the explosion, the Starship was the first to use the newly developed Raptor liquid-oxygen-methane engine, and it also applied a breakthrough design with 33 parallel engines.

Although the launch failed, the test results will have proved valuable, and important lessons can be learned from them to prepare for future launches. That the Starship did not blow up on the launch pad at the Starship Base in Houston was already regarded a success by some experts.

Being able to push such a behemoth off the ground without major problems for almost three minutes, and to test 33 of the new engines in parallel without them ever being tested before can be seen as a remarkable success.

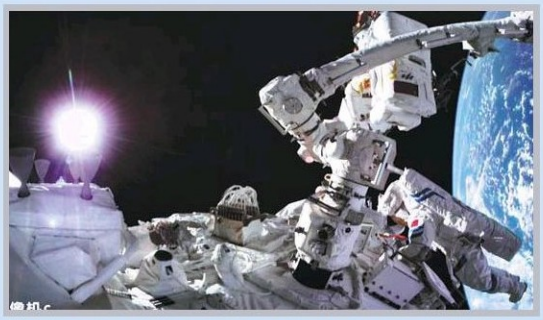
Since SpaceX sets very bold experimental targets, everybody knew beforehand that a successful launch was highly unlikely.

Space technology has always been pursued through trial and error.

— 21ST CENTURY BUSINESS HERALD

CHINA

Editor's Note: *The year 2023 marks the 30th anniversary of the founding of China National Space Administration and China is now one of the great space powers in today's world. In celebration of the eighth national Space Day on Monday, China Daily presents a four-page special report on the nation's achievements in the field.*



From left: A photo of Earth is taken from China's Tiangong Space Station by Liu Yang, a crew member of the Shenzhou XIV mission, on Oct 20. PROVIDED TO CHINA DAILY Screen image captured at Beijing Aerospace Control Center on Sept 17, shows Shenzhou XIV astronauts Cai Xuzhe (top) and Chen Dong conducting extravehicular activities. GUO ZHONGZHENG / XINHUA The Long March 2F and Shenzhou XIV spaceship are transferred to the launch pad in Jiuquan Satellite Launch Center in northwestern China's Gobi Desert on May 29. PROVIDED TO CHINA DAILY

Space program celebrates 30 years

Nation's decadeslong journey of celestial exploration continues to break new ground

By ZHAO LEI
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The first spacecraft to visit China's Tiangong space station this year — the Tianzhou 6 robotic cargo ship — is scheduled to launch in early May to transport materials for the next manned mission.

Tianzhou 6 is tasked to deliver propellants, science payloads and necessities for the astronauts, according to mission plans previously published.

Before its arrival, the Tianzhou 5 will depart the station to leave the docking hatch open for Tianzhou 6 and then burn itself up during its descent toward Earth.

Pang Zhihao, an expert on space exploration, said that compared with its predecessors, the Tianzhou 6 will carry more equipment and materials for scientific experiments and technological demonstrations.

"The Tiangong space station began formal operations at the start of this year so astronauts are spending more time on science and technology tasks. Now a large proportion of their time will be used to install and fine-tune scientific and technological apparatuses, and carry out experiments and tests," he said.

"As the bioregenerative life-support system inside Tiangong has been fully tested and proved functional, Tianzhou ships will no longer need to carry many living necessities and the space and weight saved can be used to transport more mission payloads."

The Long March 7 carrier rocket tasked with lifting the cargo spaceship has recently been transported to the Wenchang Space Launch Center in Hainan province, according to China Manned Space Agency.

The rocket is undergoing pre-launch checks with the cargo ship, the agency said.

Tiangong's current inhabitants — the three members of the Shenzhou XV mission — arrived at the station on Nov 30 to join the three Shenzhou XIV astronauts.

The two crews' meeting marked the first time six Chinese people had traveled into outer space at the same time and also the first in-orbit handover between two Chinese crews. They lived together for more than four days before the Shenzhou XIV crew flew back to Earth.

By now, the Shenzhou XV astronauts — mission commander Major General Fei Junlong, Senior Colonel Deng Qingming and Senior Colonel Zhang Lu — have conducted four spacewalks, surpassing previous crews.

During their spacewalks, Fei's team has mounted equipment required for extravehicular scientific experiments and technological demonstrations.

Their six-month journey is scheduled to conclude around the end of May, and the Shenzhou XVI crew will take over.

Decadeslong pursuit

The origin of China's aspirations to operate its own space station can be traced back to the mid-1980s when a group of distinguished space scientists started calling for government support to open manned space programs so that China would not lag behind in the global arena of space exploration.

From top: The control team monitors the automated rendezvous and docking of the Shenzhou XIV spaceship with Tiangong Space Station at Beijing Aerospace Control Center. LI XIN / XINHUA Chen Dong (right), Liu Yang (center), Cai Xuzhe, astronauts of the Shenzhou XIV mission wave to the crowds at the Jiuquan Satellite Launch Center on June 5. WANG JIANGBO / FOR CHINA DAILY Two crews from the Shenzhou XIV and XV missions meet on Tiangong Space Station on Nov 30. GUO ZHONGZHENG / XINHUA A Long March 5B rocket launches on its inaugural flight on May 5, 2020. GUO CHENG / XINHUA

In November 1986, the government launched what later became known as Project 863. The national high-tech project covered seven major fields, ranging from biology to new energy. It set two major goals for China's space sector: one was to build large carrier rockets and reusable aerospace vehicles; the other was to construct a space station.

In August 1992, a special committee formed by high-ranking leaders decided that China will use manned spacecraft to assemble a space station in orbit in the coming decades. The plan was approved in September that year by the Standing Committee of the Political Bureau of the Communist Party of China Central Committee, officially debuting the nation's manned space program.

To achieve the ambitious goal, the country made specific plans and took a systematic approach, advancing patiently from simple, multi-day missions to sophisticated, month-long flights involving several spacecraft.

After nearly 30 years of preparations, China launched the first, and central, component of its space station, the Tianhe core module, in April 2021, and began to send astronauts to fly with it to prepare for the arrival of other parts.

In the second half of last year, the Wentian and Mengtian science modules were launched to dock with Tiangong, completing the space station's construction phase.

Orbiting Earth about 400 kilometers above the ground, Tiangong now weighs nearly 100 metric tons and is expected to operate for at least 10 years as a national space-based laboratory.

Scientific platform

The station's first science section, Wentian contains eight scientific cabinets. They are mainly used to serve biological and life science studies, and can also support research on the growth, aging and genetic traits of plants, animals and microbes in the space environment.

The exterior of the module has 22 extravehicular payload adapters capable of carrying out scientific experiments that require exposure to cosmic rays, vacuums and solar winds.

Wentian also serves as a back-up control station to the Tianhe core module in case of emergencies or malfunctions. It has all the same flight-control devices as those inside the core module to operate the entire Tiangong station.

The second lab module, Mengtian, is the world's largest single-body spacecraft now in active service. It contains 13 scientific cabinets used for microgravity studies and experiments in fluid physics, materials science, combustion science and fundamental physics. It also carries 37 extravehicular payload adapters.

A major technical feature of Mengtian is that it can move scientific apparatus out of the Tiangong station without requiring any manual labor by the astronauts to conduct extravehicular experiments and bring them back again.

The lab module is capable of launching miniature spacecraft, such as CubeSats.

CHINA

CHINA'S SPACE MISSIONS BREAK NEW GROUND

By ZHAO LEI
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Chinese scientists have made major advances in the research of Earth's nearest celestial neighbor, the moon, thanks to samples and data gathered by China's lunar probes.

In the latest development, water locked in glass beads has been found in lunar samples returned by the Chang'e 5 mission.

A study published in Nature Geoscience journal late last month revealed that the soil samples collected by Chang'e 5 had impact glass beads that contained water in the form of hydroxyl, a molecule consisting of one atom of oxygen and one of hydrogen.

Hydroxyl is one of the most common ions in water.

The beads are created when meteoroids hit the moon's surface, throwing up hot molten droplets that solidify. They act like a sponge, soaking up hydrogen atoms carried by solar winds to form hydroxyl, thus playing a pivotal role in the water cycle on the lunar surface, the study said.

The paper was published by a team led by scientists from the Institute of Geology and Geophysics from the Chinese Academy of Sciences.

Their findings indicate that impact glass on the lunar surface is capable of storing solar wind-derived water and releasing it into space.

The water is relatively easy to extract and could represent a potential resource for future lunar exploration, according to Hu Sen, a researcher from the institute and one of the key scientists behind the study.

While each bead only holds a tiny amount of water, vast amounts of glass beads in the lunar soil could hold up to 270 billion metric tons of water, researchers estimate.

New lunar mineral found

The samples also led to the discovery of a sixth new lunar mineral.

Named Changesite-(Y), it was found last year by scientists at the Beijing Research Institute of Uranium Geology and has been certified by the International Mineralogical Association and its Commission on New Minerals, Nomenclature and Classification.

Changesite- (Y), which is a type of lunar merrillite, a calcium phosphate mineral, is the first lunar mineral discovered by Chinese scientists, making China the third country in the world after the United States and Russia to have achieved such a feat.

Li Ziying, chief scientist of lunar sample research at the Beijing Research Institute of Uranium Geology, said the area where the Chang'e 5 probe landed and collected the samples is geologically younger than the landing sites chosen for previous US and Soviet missions, and so the characteristics of the soil there could be different from previously collected samples.

In addition, scientists at the institute measured the content and traits of helium-3 in the samples. Li said that the results may help facilitate prospecting and assessments of the resource, which is an ideal fuel for future nuclear fusion power plants.

One of the most notable space missions in 2020, the 23-day Chang'e 5 robotic mission was the first to return samples to China and one of the country's most sophisticated and challenging space endeavors. On Dec 17, 2020, it returned to Earth with 1,731 grams of rocks and soil, the first lunar samples collected since the Apollo era.

Before Chang'e 5, China deployed two lunar landing craft and two rovers. Yutu 2, which was part of the Chang'e 4 mission, is now the longest-working lunar rover of all time and continues to transmit data and images.

Martian exploration

Elsewhere in the solar system, Mars rover Zhurong has traveled more than 1,900 meters and obtained a great deal of data and images en route to its destination, an ancient coastal area on Utopia Planitia, the vast Martian plain where it landed. The 1.85-meter-tall, 240-kilogram robot, named after the ancient Chinese god of fire, touched down on the Red Planet on May 15, 2021, and began to travel across its surface a week later.

Zhurong is the core component of the Tianwen 1 mission, China's first independent interplanetary exploration mission.

Zhurong and the Tianwen 1 orbiter, which relays signals for the rover, have transmitted around 1,800 gigabytes of raw scientific data to Earth.

Pang Zhihao, an expert on space exploration technology and a renowned writer on spaceflight, said that Tianwen 1 marks a milestone for China's space industry and is a symbol of its rising status in the field of deep-space exploration.

"Scientifically speaking, the mission has been retrieving valuable information about Mars and the solar system and has given Chinese researchers their first opportunity to closely observe and study the planet. And in terms of engineering, it shows China's ability to organize an exceptionally sophisticated, challenging expedition," he said.

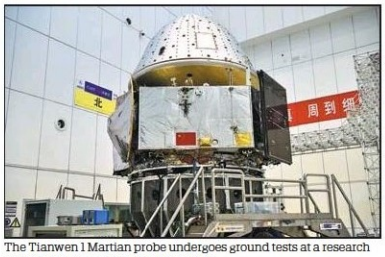
Tianwen 1 has signaled a good start to the country's interplanetary program and has laid a solid foundation for the next steps, which will involve more demanding endeavors such as bringing Martian soil samples back to Earth and landing a probe on an asteroid, Pang said.

Lunar samples, mineral discovery and experience for future missions among gains

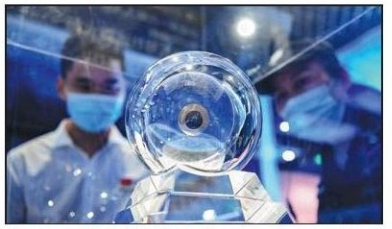
"... it (Tianwen 1) shows China's ability to organize an exceptionally sophisticated, challenging expedition."

Pang Zhihao, expert on space exploration technology

Top: The ZQ-2 rocket, developed by LandSpace, sits on the launch pad at the Jiuquan Satellite Launch Center in northwestern China's Gobi Desert, on Dec 14 last year. PROVIDED TO CHINA DAILY
Above: The Long March 5 carrier rocket, which is tasked with lifting the Chang'e 5 lunar probe, stands inside a service tower at the Wenchang Space Launch Center in Hainan province. PROVIDED TO CHINA DAILY



The Tianwen 1 Martian probe undergoes ground tests at a research facility in Beijing. PROVIDED TO CHINA DAILY



A lunar sample brought back by the Chang'e-5 probe is on exhibition at the Hainan Chronicles Museum, Hainan province, on May 18. SU BIKUN / FOR CHINA DAILY

New Long March rocket to be bigger, more powerful

By ZHAO LEI

Chinese rocket scientists are developing a new, super-heavy carrier rocket known as the Long March 9.

Designers at the China Academy of Launch Vehicle Technology are currently working on the baseline model of the Long March 9. The three-stage rocket will stand about 110 meters tall, and have a liftoff weight of about 4,000 metric tons and a thrust of nearly 6,000 tons, and its core stage will be about 10 meters in diameter.

The new rocket will be powerful enough to carry craft weighing up to 50 tons to an Earth-moon transfer trajectory for lunar missions such as the construction of a large-scale science or mining outpost. It will also be able to send spacecraft on deep-space missions, including the ambitious venture to place Chinese astronauts on Mars.

In addition to the baseline model, the structure of a second model for spaceflights to low-Earth orbit has also been sketched out.

The second model will have two stages, which means it will be shorter than the baseline rocket, and will be capable of deploying spacecraft with a combined weight of 150 tons to a low-Earth orbit.

The first stage, which has the strongest lift power, will be reusable on both models, which will significantly reduce costs.

Once the Long March 9 enters operation, it will have a carrying capacity five times greater than that of the Long March 5, which is currently the country's most powerful rocket.

China has 23 kinds of carrier rockets in active service, and most belong to the Long March family, which is produced by State-owned giant China Aerospace Science and Technology Corp.

With the government encouraging and supporting the growth of private space companies, China also has several privately built rockets.

The TL 2 is the newest model. Made by Space Pioneer in Beijing, it reached orbit earlier this month, becoming the country's first privately built liquid-fuel rocket to fulfill an orbital mission.

Uniquely, the TL 2 achieved success on its maiden flight.

All previous privately built liquid-propellant rocket types, developed by companies including SpaceX and Virgin Orbit, failed their first flights.

Prior to Space Pioneer's launch, i-Space and Galactic Energy, private companies also based in Beijing, had used solid-propellant rockets to transport satellites to orbit. Solid-propellant rockets are easier to design and make than liquid-fuel rockets, but they have a smaller capacity and cannot be used to launch large satellites or to deploy spacecraft to high orbits.

Last December, Beijing company LandSpace carried out the first test flight of the ZQ 2, the world's first methane-propelled carrier rocket, at a launch facility in the Gobi Desert.

The rocket successfully crossed the Karman Line, the globally recognized boundary between Earth's atmosphere and the edge of space, but malfunctioned in its second stage and failed to reach orbit.

The ZQ 2's second flight is scheduled to take place this summer.

CHINA

Dec 2, 2013
The Chang'e 3 mission begins, with the aim of sending a robotic probe to the moon. After a 12-day flight, the probe lands, becoming the first Chinese spacecraft to achieve the feat and the first craft from any country to achieve the goal in nearly four decades. Yutu, the first Chinese lunar rover, moves onto the lunar soil on Dec 15 and begins operations. It works until July 2016.

Dec 8, 2018
China's fourth lunar probe, Chang'e 4, is launched toward the far side of the moon. After a 26-day journey, the robotic spacecraft lands in the Von Karman crater, beginning humanity's first close observation of the area. The Yutu 2 rover has worked on the moon for nearly 1,600 days and traveled more than 1,500 meters on the lunar soil, making it the longest-working rover ever.

June 5, 2019
A Long March 11 solid-propellant carrier rocket is used for China's first seaborne space launch in its territorial waters. Prior to the mission, the country has conducted more than 310 carrier rocket launches at its four land-based space launch centers. So far, China has conducted five sea-based launches.

July 25, 2019
i-Space, a Beijing startup, becomes the first private enterprise in China to successfully conduct an orbital mission. The company launches its first SQX-1 carrier rocket from the Jiuquan Satellite Launch Center, sending two satellites and three experimental payloads into space. So far, three private Chinese rocket makers have conducted eight successful orbital missions.

July 23, 2020
The Tianwen 1 mission, the nation's first indepen interplanetary exploration, is launched from Wenchang. It travels more than 470 million kilom before entering Mars' orbit in February 2021. Its named Zhurong, touches down on the planet on 15, 2021, and begins work on the surface a week So far, the rover has traveled more than 1,900 m and obtained a great deal of raw data.

MILESTONES OF CHINA'S SPACE INDUSTRY

REA

Ove

23
Number of
now in serv
which are
Long Marc

Mengtian space lab launched on Oct 31, 2022

Tianhe core module launched on April 29, 2021

Tianzhou 5 cargo spacecraft launched on Nov 12, 2022

Shenzhou XV manned spaceship launched on Nov 29, 2022

Shenzhou XVI manned spaceship to be launched in May 2023

Wentian space lab launched on July 24, 2022

These scientific tools are mounted on the orbiter and the rover of the Tianwen 1 mission

High-resolution camera to take pictures of the landing site and high-value zones

Medium-resolution camera to generate remote-sensing images of Mars

Ground-penetrating radars to investigate subsurface geological structures

The Mars Rover Zhurong

TIANGONG SPACE STATION

A CUTTING-EDGE SPACE-BASED LABORATORY

8
Number of scientific cabinets inside the Wentian science module, mainly used to serve biological and life science studies, and to support research on the growth, aging and genetic traits of plants, animals and microbes in the space environment.

22
Number of extravehicular payload adapters on Wentian's exterior to conduct scientific experiments that require exposure to cosmic rays, vacuums and solar winds.

13
Number of scientific cabinets inside the Mengtian science module — the world's largest single-body spacecraft currently in active service — for microgravity studies and experiments in fluid physics, materials science, combustion science and fundamental physics.

37
Number of extravehicular payload adapters outside Mengtian.

CHANG'E 3
a milestone in the nation's space exploration history, was launched from Xichang on Dec 2, 2013. It was the first Chinese spacecraft to soft land on the moon. It released the country's first lunar rover onto the moon's surface.

CHANG'E 2
was launched on Oct 1, 2010, to conduct high-definition imaging of the moon and check landing conditions for the Chang'e 3 probe. Chang'e 2 is now on a mission to verify deep-space technologies.

CHANG'E 1
probe's tasks included obtaining lunar images and performing scientific surveys. It was launched on Oct 24, 2007. In 2008, a map of the entire lunar surface, based on data from Chang'e 1, was published.

LUNAR
China launched its robotic l
naming it **Chang'e** after the

Shenzhou VII mission
Launched on Sept 25, 2008, lasting nearly three days. China's first extravehicular activity. Three crew members.

Tiangong I mission
Launched on Sept 29, 2011, lasting about four-and-a-half years. As China's first space laboratory, it received astronauts from the Shenzhou IX and Shenzhou X missions.

Shenzhou VI mission
Launched on Oct 12, 2005, lasting nearly five days. China's first multi-staff spaceflight. Two crew members.

Shenzhou V mission
Launched on Oct 15, 2003, lasting 21 hours. China's first manned space mission. One crew member.

MANNED SPACE M
before the in-orbit construction of Tiango

July 31, 2020

The domestically developed Beidou Navigation Satellite System is completed and starts providing full-scale global services. Since 2000, more than 60 Beidou satellites have been launched, and some have been retired. Beidou is now one of the two space-based navigation networks with global coverage — the other being GPS from the United States.

Nov 24, 2020

The Chang'e 5 robotic moon mission is launched from the Wenchang Space Launch Center. After landing on Dec 1, it brings 1.731 grams of lunar rock and soil back to the Earth on Dec 17, about 44 years after the last lunar substances were returned. The 23-day mission makes China the third country to retrieve lunar samples.

April 29, 2021

In-orbit construction of the Tiangong space station begins as the Tianhe core module — the first and central component — is launched. The module has three parts: a connecting section; a life-support-and-control section; and a resources section. The capsule is bigger and heavier than any other Chinese spacecraft launched before it. To date, 12 astronauts have lived in the craft.

Dec 31, 2022

President Xi Jinping announces the completion of the Tiangong space station in his New Year address, marking the realization of a grand aspiration pursued by Chinese scientists and space industry workers for three decades. The station consists of three major components — a core module and two science lab modules — and has an overall weight of nearly 100 metric tons. It is designed to operate for more than 10 years.

ACH FOR THE STARS

China is celebrating its eighth Space Day, which falls on April 24 each year.
r the past decade, the nation has made remarkable achievements in space exploration.

rocket models
vice in China, 16 of
members of the
h family.

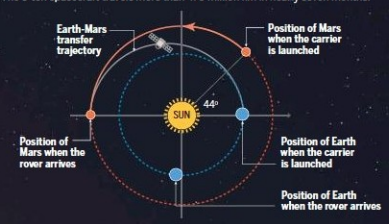
540
Number of Chinese satellites working in Earth's orbit.

4
Number of Chinese probes that have landed on other celestial bodies in the solar system — three on the moon and one on Mars.

341
Number of space launch missions conducted by China since the 18th National Congress of the Communist Party of China in November 2012, accounting for 65 percent of all Chinese rocket flights.

LONG JOURNEY

The 5-ton spacecraft travels more than 470 million km in nearly seven months.



Mars energetic particle analyzer to investigate energetic particles in the spatial environment

Mars ion and neutral particle analyzer to study the ions and neutral particles of solar wind and the Martian spatial environment

Navigation and topography camera to provide navigation and positioning for rover and obtain high-resolution 3D images of the landing site and areas around it

Mars surface compound detector to study high-resolution spectral signatures of surface substances

MISSIONS

unar exploration program in 2004,
moon goddess in Chinese legend.

CHANG'E 4

was launched on Dec 8, 2018. It completed a soft landing on the far side of the moon, making it the first expedition in the history of space exploration to visit the unexplored lunar region.

CHANG'E 5

was launched on Nov 24, 2020, and landed on the moon on Dec 1 that year. The 23-day, landmark mission carried 1.731 grams of lunar rock and soil to Earth on Dec 17. Chang'e 5 was one of China's most sophisticated and challenging space endeavors, and made China the third country to retrieve materials from the moon after the United States and the Soviet Union.

CHANG'E 6

is expected to be launched around 2025 to land on the far side of the moon and bring back samples.

CHANG'E 7

will search for traces of water at the moon's South Pole, investigate the environment and weather and survey its landform.

CHANG'E 8

is tasked with landing near Chang'e 7 on the moon's South Pole, allowing the two missions' components — orbiters, landers, rovers and detectors — to work together to form a prototype of a robotic scientific outpost.

henzhou IX mission

unched on June 16, 2012,
sting nearly 13 days. China's first
pace docking maneuver (with
iangong I) and the first time that
hinese astronauts entered a
pace lab. Three crew members.

Shenzhou X mission

Launched on June 11, 2013, lasting nearly 15 days. During the mission, the first space lecture for Chinese students was made. Three crew members.

Tiangong II mission

Launched on Sept 15, 2016, lasting nearly three years. China's second space laboratory received astronauts from the Shenzhou XI mission.

Shenzhou XI mission

Launched on Oct 17, 2016, lasting 33 days. The longest stay in space by Chinese astronauts. Two crew members.

ISSIONS

ong Space Station

ASTRONAUTS WHO HAVE BEEN ON SPACEFLIGHTS

YANG LIWEI
Native of Liaoning province. Took part in the Shenzhou V mission in 2003.

FEI JUNLONG
Native of Jiangsu province. Took part in the Shenzhou VI mission in 2005, and is taking part in the ongoing Shenzhou XV mission launched in November last year.

NIE HAISHENG
Native of Hubei province. Took part in the Shenzhou VI mission in 2005, the Shenzhou X/Tiangong I mission in 2013 and the Shenzhou XII mission in 2021.

ZHAI ZHIGANG
Native of Heilongjiang province. Took part in the Shenzhou VII mission in 2008 and became the first Chinese astronaut to carry out a spacewalk. He was also part of the Shenzhou XIII mission from October 2021 to April last year.

JING HAIPENG
Native of Shanxi province. Took part in the Shenzhou VII, the Shenzhou IX/Tiangong I and Shenzhou XI/Tiangong II missions.

LIU BOMING
Native of Heilongjiang province. Took part in the Shenzhou VII mission in 2008 and the Shenzhou XII mission in 2021.

LIU WANG
Native of Shanxi province. Took part in the Shenzhou IX/Tiangong I mission in 2012.

ZHANG XIAOGUANG
Native of Liaoning province. Took part in the Shenzhou X/Tiangong I mission in 2013.

LIU YANG
Native of Henan province. Took part in the Shenzhou IX/Tiangong I mission in 2012, becoming the first Chinese woman in space. She was also part of the Shenzhou XIV mission in 2022.

WANG YAPING
Native of Shandong province. Took part in the Shenzhou X/Tiangong I mission in 2013. She was also part of the Shenzhou XIII mission from October 2021 to April last year, during which she became the first Chinese woman to conduct a spacewalk.

YE GUANGFU
Native of Sichuan province. Took part in the Shenzhou XIII mission from October 2021 to April last year.

CAI XUZHE
Native of Hebei province. Took part in the Shenzhou XIV mission last year.

DENG QINGMING
Native of Jiangxi province. Currently taking part in the ongoing Shenzhou XV mission launched in November.

ZHANG LU
Native of Hunan province. Currently taking part in the ongoing Shenzhou XV mission launched in November.

Sources: China National Space Administration, China Manned Space Agency

GRAPHICS BY TIAN CHI / CHINA DAILY