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## Long March rockets mark their 500th spaceflight

By ZHAO LEI  
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China used a Long March 2D carrier rocket on Sunday morning to send several remote-sensing satellites into space, marking the 500th launch of the Long March family. The rocket blasted off at 9:58 am from the Xichang Satellite Launch Center in Southwest China's Sichuan province, spitting red-orange flames and soaring into bright skies, which was caught on video published by the Shanghai Academy of Spaceflight Technology, the maker of the Long March 2D series. It was China's 59th rocket launch this year and the 19th flight of the

Long March 2D model in 2023. The overall success rate of the Long March fleet is around 97 percent. Of the 500 liftoffs, 297 were carried out by models developed by the China Academy of Launch Vehicle Technology in Beijing and 203 by the Shanghai Academy of Spaceflight Technology. Both academies are subsidiaries of the State-owned conglomerate China Aerospace Science and Technology Corp, the nation's dominant space contractor.

The Long March 2D is one of the most reliable rockets in China. Since its debut flight in August 1992, the model has been used in 85 flights, all of which have been successful. This

has led to it becoming well-known as the "gold medal rocket model" in China's space industry. The 40.6-meter-tall rocket has a diameter of 3.35 meters and a liftoff weight of 251 metric tons. Its typical tasks are to transport satellites to low-Earth or sun-synchronous orbits. The launch vehicle is capable of sending a 1.3-ton spacecraft into a sun-synchronous orbit with an altitude of 700 kilometers, or satellites with a combined weight of 4 tons into a low-Earth orbit. In June, the 76th flight of the Long March 2D series sent a total of 41 satellites into space, setting a new national record for the largest number of spacecraft launched in a single

mission. China launched its first carrier rocket — a Long March 1 — in April 1970 to send its first satellite, Dongfanghong 1, or East Red 1, into space. The mission made China the fifth country capable of building and launching its own carrier rocket to reach Earth's orbit. It took the Long March family 37 years to conduct its first 100 launches. The next 100 were made in seven-and-a-half years; the third 100 launches in over four years; the fourth 100 launches in two years and nine months; and the most recent 100 missions in only two years. China has developed and launched more than 20 types of

Long March rockets, and 16 of them are in active service. Zhang Zhi, a senior rocket designer at the China Academy of Launch Vehicle Technology, said that engineers are working on the research and development of the country's next-generation crew-carrying rocket, and the new model, named Long March 10, is expected to be ready for its debut flight around 2027. "The Long March 10 will be a brand new type of launch vehicle, and will be tasked with launching the country's new-generation manned spacecraft and the lunar landing module," he said. In addition to the Long March family, there are multiple types of Chinese carrier rockets developed by another State-owned space contractor, China Aerospace Science and Industry Corp, and several private

enterprises. So far, Chinese carrier rockets have conducted 564 launches. The payloads in Sunday's mission — several satellites in the Yaogan 39 series — were manufactured by the Shanghai Academy and the China Academy of Space Technology in Beijing, which is also part of China Aerospace Science and Technology Corp. Remote-sensing satellites refer to those tasked with observing, surveying and measuring objects on land or at sea as well as monitoring weather. China has so far sent more than 300 civilian remote-sensing satellites into orbit. The Yaogan family is the largest fleet of remote-sensing spacecraft in the country, and their data has been widely used by governments, public service sectors and businesses.

## Next-generation methane rocket to be more powerful

ZQ 3 will be made of stainless steel, with its first stage designed to be reusable

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LandSpace, a leading Chinese private space company, has unveiled design details for its ZQ 3 carrier rocket, which the company said will be made primarily of stainless steel. The Beijing-based rocket maker said the ZQ 3 will be 76.6 meters tall and 4.5 meters wide, and will weigh nearly 660 metric tons when fully fueled. With a liftoff thrust of 900 tons, it will be able to transport spacecraft with a combined weight of 21.3 tons to a low-Earth orbit. The rocket will be propelled by LandSpace's own methane engines. The first stage will have nine TQ-12B engines, creating the major lift for

the rocket, while the second stage will have a TQ-15B engine. Compared with traditional types of rocket engines that can function only once, a methane engine is reusable and more environmentally friendly. LandSpace said the use of methane engines will make the ZQ 3's first stage reusable. Plans for the new rocket were released by LandSpace's founder and CEO, Zhang Changu, at a news conference on Saturday at the Jiuquan Satellite Launch Center in northwestern China. He said all of the rocket's propellant tanks will be built of stainless steel, which features good strength, resistance to scorching and corrosion, and a very competitive cost.

Zhang said the company plans to carry out a recovery test of the rocket's first stage this month, and intends to make major components for the first prototype next year. If everything goes according to plan, the first prototype will be assembled in 2025, he said. On Saturday morning, LandSpace achieved the second successful flight of its ZQ 2 rocket type, marking the world's first satellite deployment by a methane-propelled rocket. The ZQ 2-Y3 rocket blasted off at 7:39 am from the Jiuquan Satellite Launch Center and deployed three experimental satellites into a sun-synchronous orbit at an altitude of 460 kilometers, LandSpace said in a news release. The Y3 in the rocket's name meant the craft was the third in the ZQ 2 series. The ZQ 2 is the world's first meth-

ane-fueled rocket to reach Earth orbit and also the largest and most powerful private rocket in China. It made its maiden flight from the Jiuquan center in December last year. 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. In July, the ZQ 2's second launch took place at Jiuquan and succeeded, marking the first orbital mission of any methane-fueled rocket. It did not carry any satellites. The ZQ 2 model is 49.5 meters tall and 3.35 meters wide. It has a liftoff weight of 220 tons and a launch thrust of 268 tons. The rocket is capable of placing satellites with a combined weight of 1.5 tons into a typical sun-synchronous orbit about 500 km above the Earth, LandSpace said.

### Opinion Line

## NASA opening door would be boon for global space research

The "small yard, high fence" policies of the US with regard to China generally extend to space research cooperation. Such research collaborations are barred by a US law that forbids the use of NASA funds for projects with China or Chinese-owned companies, unless NASA certifies to Congress that there is no risk of transferring technology or data to China and Congress gives its approval. NASA recently emailed planetary scientists saying that it had sent the necessary certification to Congress and agency-funded researchers could apply to the China National Space Administration to use samples of the lunar soil for research. It is believed that analyzing the samples could lead to new scientific insights into the geological history of the moon and potentially inform NASA's future lunar exploration plans, the agency suggested. US

researchers had started lobbying NASA officials to explore the possibility of gaining access to the samples soon after the Chang'e 5 sample return capsule touched down. The ban on bilateral cooperation was an amendment to NASA's annual appropriations bill by former representative Frank Wolf in 2011, who hoped to prevent China from developing space-related technology and expertise through collaborations with NASA. When the Wolf Amendment was passed, the gap between China and the US in space technology was still huge. Thus US politicians thought that such "high fences" would maintain the US' advantages in space indefinitely. However, China has made rapid progress despite the US' efforts to hinder its endeavors. Over the past 12 years China has conducted a number of

successful moon missions, including the first landing of a probe on the dark side of the moon. In comparison, 14 years have passed since the US' last moon mission, the Lunar Reconnaissance Orbiter in 2009. US researchers are hoping the exception sets a precedent. Chang'e 6, which is scheduled to be launched in May 2024, will attempt to return samples from the far side of the moon for the first time. Chinese researchers meanwhile are hoping to get access to Apollo lunar soil samples for comparison purposes. So far NASA has not shared any Apollo samples with China. Instead of building fences, the US should open its doors to space cooperation with China, as that is the best way to build trust and enhance understanding of the Earth and its celestial environs. — ZHANG ZHOUJIANG, CHINA DAILY