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China Aims for the Moon – and Beyond

Shenzhou 9 spacecraft rocket launches from the Jiuquan Satellite Launch Center in China (June 16, 2012).

Image Credit: AP Photo/Ng Han Guan

China's space program, past, present, and future.

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China's space program dates back to the 1950s, when China first started developing its own missiles, modeled on those of the USSR, but some would argue that the space age was actually born in China, citing its use of "fire arrows" in the 13th century as the first example of rockets. Mao Zedong himself was impressed by the launch of Sputnik in 1957 and wanted China to move forward quickly in the development of satellites. But these plans were postponed and it was not until 1970 that China launched its first small satellite, long after the United States and Russia.

An ambitious program, including the launch of astronauts to space, was approved by Mao Zedong, Prime Minister Zhou Enlai, and Minister of Defense Lin Biao in 1970, but, in the turbulent political context of the 1970s, it was canceled in 1978 by Deng Xiaoping, who was back to power. Deng had a very pragmatic view of the interest of space and focused the Chinese space program on practical applications, leading to the launch of the first Chinese telecommunications satellite in 1984. Since then China has successfully developed civilian and military applications, including telecommunications, remote sensing, meteorology, and navigation. However, with the rising geopolitical posture of the country, more prestige-oriented projects, in lunar and deep space exploration, and human spaceflight, were promoted in the 1990s, including the approval, in September 1992, of an orbital space station as the main goal of the program.

As a result, despite China's late entry into space exploration – the first Chinese astronaut was not sent into space until 2003 – it has caught up lately at an impressive rate. By 2017, 11 *taikonauts* (a term used for Chinese astronauts) had successfully orbited the Earth, demonstrating China's growing participation in space. In 2013, China landed the Jade Rabbit rover on the moon, representing the first time that a robot had landed on the moon's surface in nearly half a century.

However, China's record in space has not consistently been impressive, with the most notorious instance of irresponsible space activity being the 2007 anti-satellite (ASAT) test. According to official Chinese media, the test was defensive in nature. Yet in reality it was meant to test China's ability to destroy satellites, which several militaries – and most notably the American military – depend on for communications and geolocation information. While successful in destroying one of its own weather satellites, this act has jeopardized China's future cooperation prospects with other states. The ASAT test was highly contentious, as it produced a massive amount of space debris, endangering many

other nations' space assets. Altogether the test reinforced suspicionsabout China's intentions in outer space.

Contemporary Assets and Policies of China

Unlike in other countries, but like in the Soviet Union in the past, China's space program and its military are essentially the same entity. Despite China's ongoing exclusion from the International Space Station (ISS) – due to U.S. opposition – it currently possesses many impressive space assets. In 2016, China achieved a record number of rocket launches. These included seven "Long March" rockets, including the maiden flight of the Long March 5 in November 2016. The new rocket is capable of ferrying 25 metric tons (MT) of cargo into low-Earth orbit (LEO), putting it on a par with the Delta IV Heavy and Europe's Ariane V rockets and doubling the payload which China is able to place in space. Also in 2016, in June, China launched a new Long March 7 rocket, which is the "middle child" in the country's arsenal of launchers, sitting between the heavier Long March 5 and the lighter Long March 6. Progress continued, despite some setbacks, in 2017, including China's first launch of a cargo spacecraft using a Long March 7 Y2 rocket in April.

The proposed Long March 9 aims to increase payload to 140 MT for LEO, meaning that China should be able to operate large human and cargo mission and carry spacecraft within the next five to seven years. China also has its own spacecraft – known as *Shenzhou* – modeled on the Russian Soyuz vehicles, which has served as the primary mechanism for transporting *taikonauts* into and out of space, but is now due for replacement.

China additionally has a hypersonic missile program and has conducted several major tests in the last two years alone, including on missiles with nuclear capability.

China also operates its own navigation satellite system – known as BeiDou – providing regional coverage over China and the Asia-Pacific, with accuracy of up to ten centimeters. Aside from providing accurate geolocation information for Chinese weapon systems and communication coverage for its military various forms of information, users of BeiDou, which include the Pakistani military, can take advantage of a short-message service not possible with the U.S. GPS.

Another of China's activities in space involves monitoring space debris using a tracking system. This strategy is an important aspect in repairing trust transnationally and demonstrating a commitment to the responsible and secure use of space, following the 2007 ASAT test. The Chinese Space Debris Monitoring and Application Center, which is part of the China National Space Administration, is tracking space debris with a special focus on the smallest pieces – those which are smaller than one centimeter and of which there are around 100 million. In 2015, China also launched a space junk monitoring center to protect its spacecraft in orbit.

China's objectives as part of its outer space endeavors are declaredly defensive. According to a 2015 white papercalled "China's Military Strategy 2015," China's military policy is one of active defense and its intention is to secure its spot in space for peaceful purposes, such as space exploration, supporting the economy, and developing technology.

In 2015, at the Conference on Disarmament in Geneva, China, along with Russia, proposed an updated version of the "Treaty on the prevention of the placement of weapons in Outer Space, the threat or use of force against outer space objects (CD/1985)." The Russian-led proposal, known as

the "no first placement" initiative, calls on nations not to deploy weapons in space. This resolution is nonbinding and intended more as a method to even the space-warfare playing field, rather than for altruistic peaceful purposes.

Some see China's rapid expansion into space as a necessary step to change the military balance on Earth and defend its policies. By strengthening its military with space technologies (which boost military capabilities by improving communications and geolocation services), China is better placed better to defend against potentially aggressive behavior.

Future of the Chinese Space Program

In December 2016, China released a white paper detailing its plans to expand the "strength and size" of its space program. The nation plans to increase the estimated $6 billion per year it currently invests in space activities, in order to fund numerous proposed initiatives. The plan outlines a robotic lunar program made up of several missions. These include the aim of becoming the first country to soft land a probe on the far side of the moon (planned for this year) and the launch of the Chang'e-5 lunar probe – a technically complex process in which the probe will land, collect samples, return to a docking in lunar orbit, and then come back to Earth. On the surface, these missions appear largely scientific and they do indeed improve China's capacity to explore deeper into space. However, the routinization of precision maneuvering in space also has military implications, as the technology required for such endeavors parallels the skills needed for military operations in space. These include defensive skills, such as repairing and maintaining satellites.

In addition, China's BeiDou navigation system is on course to provide global coverage using 35 satellites by 2020. In September 2016, China sent its second space laboratory into orbit – Tiangong 2 – after it was announced that the Chinese National Space Administration had lost control of its predecessor – Tiangong 1 – and that it would reenter the Earth's atmosphere in March 2018. The launch of Tiangong 2 was in preparation for the establishment of a permanent manned space station by 2022, finally implementing the goal approved 30 years before. The space station is being constructed at a fast pace and is scheduled for launch into orbit in 2020. With the potential retirement of the ISS after 2025, other countries could feasibly rely on China for space research, if it becomes the only country with a space station.

Recently, China became the first country to begin testing on a quantum-enabled satellite, which aims to investigation hack-proof communication keys using quantum encryption. If successful, this technology could be upscaled to create a hack-proof satellite communication network, which would naturally have great security implications, in light of the increasing threat posed by cyberattacks to communications infrastructure. This initiative, along with those mentioned previously, is clearly in line with China's goal of becoming a global science and technology leader.

China's tactics indicate President Xi Jinping's strong ambitions to transform the nation into the next space power and to strengthen Chinese military capabilities at a rapid pace, while helping legitimize the regime on Earth. In the near future we could feasibly see a leveling of the outer space playing field between several major powers, or potentially the shifting of the current power in a new direction. After all, China is not the only regional space player. Japan maintains a highly sophisticated space program, and India is also developing lunar and deep-space capacities, albeit with less media attention.

Concerns over China's role in outer space were also expressed poignantly in a testimony by James Lewis of the Center for Strategic and International Studies before the House Space Science and Technology in September 2016. China was fast consolidating its position as a top space power in the world, pursuing several largescale projects simultaneously – although still spending less than the United States and Russia on space. However, Lewis' testimony expressed an already familiar concern: besides a few short white papers, there is a lack of transparency in China's military space programs and its release of technical information is scarce compared to what NASA or the European Space Agency provide.

The problem of trust has already surfaced between the United States and China, and the lack of transparency in outer space affairs risks further straining the relations between the two powers. More generally, it can set a precedent for other nations too, which may feel more inclined to be more secretive about their intentions on space.

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