

## INSIGHTS

## China Forges Ahead in Space

## Voice of the World

Edited by GONG Qian

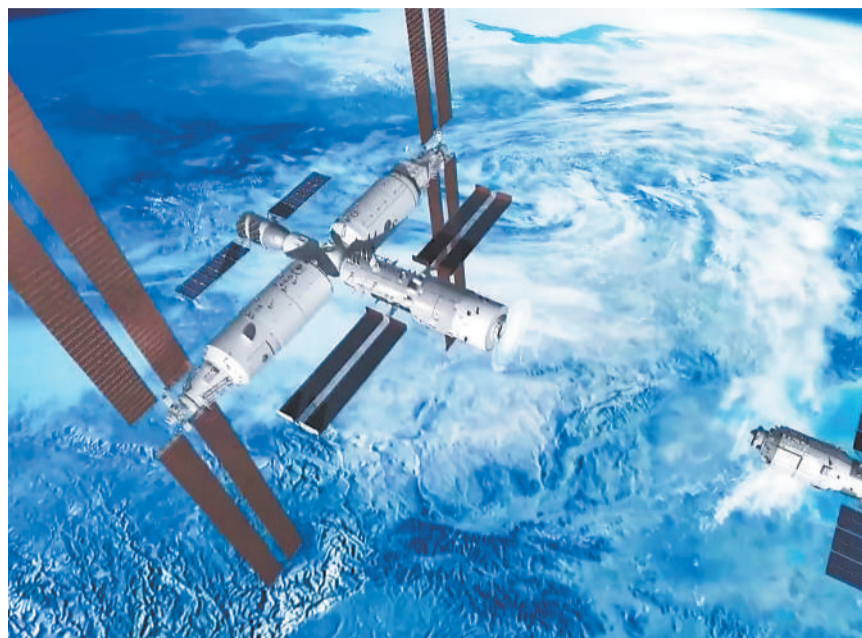
Looking back to the past decades, China has ramped up its solar system and space science exploration to become a powerful player in the field with many major feats. They include the Chang'e 5 mission, China's fifth lunar exploration that brought back lunar samples in 2020; the Zhurong rover landing on Mars in 2021; and the crews of Shenzhou-15 and Shenzhou-16, China's manned aircraft, meeting in space in 2023. These and other impressive achievements have given a huge boost to space science and the science community.

China is now building on these accomplishments with a series of major missions across the next decade, *Astronomy Magazine* reported.

Its space exploration programs in 2024 and near future include Chang'e-6 missions to collect more lunar samples and four more spacecraft missions.

## Eye-catching missions in 2024

In January, the Tianzhou-7 cargo craft was sent to Tiangong, China's space station. The three-hour docking was "fuel and technology intensive", said *SpaceNews*. The Tianzhou spacecraft has recently been upgraded and can carry around 7,400 kg of cargo to Tiangong. This improvement means now China needs to launch a resupply mission once every eight months in-



The simulated image shows China's cargo spacecraft Tianzhou-7 docking with the Tiangong space station. (PHOTO: CHINA MANNED SPACE)

stead of once every six months, according to *Space.com*.

Additionally, China plans to launch three further missions to Tiangong this year — the Shenzhou-18 and 19 crewed missions and the Tianzhou-8 mission.

The world is awaiting another big move in lunar exploration. The Chang'e-6 mission, scheduled to take place later this year, is tasked with bringing back samples from the far side of the moon, a never-before accomplished feat, *Universe Today* reported on its website.

China's consistent investment in and dedication to space discovery are evidenced by this newest endeavor, another

significant stride that propagates not just national but international astrophysical knowledge, said *ISP Today*.

"With the future Chang'e 6 mission, the limits of human exploration will be pushed even farther, as we seek to unveil the mysteries that lie in the shadowed craters and rugged terrain of our Moon's silent sentinel," *ISP Today* noted.

## Forging international collaborations

Already one of the world's top space powers, China is increasingly looking to forge international collaborations.

The Chang'e-6 is expected to carry

equipment from France, Italy, the EU and Pakistan on the mission's lander and orbiter. This level of international participation highlights the global interest in lunar exploration and the growing recognition of China's capabilities in space missions, said *Space Daily*.

The China National Space Administration (CNSA) has announced opportunities to join both the Chang'e-7 and Chang'e-8 missions, which are expected to be launched in 2026 and 2028, respectively.

According to *BNN Breaking*, the Chang'e-8 mission shows the power of collaboration and innovation in space exploration. By inviting developers from around the world to contribute to the mission, the CNSA is fostering a global community of space enthusiasts and experts working towards a common goal. This is necessary to push the limits of what's possible in space exploration and unlock the secrets of the universe.

With future missions in the pipeline, China is paving the way for the construction of an International Lunar Research Station. As one of the initiators of the program, China is inviting more global partners to participate in it.

It is clear that China continues to advance its capabilities and has set out a roadmap to comprehensively explore the solar system via lunar, planetary and deep-space missions. These in turn are strengthening and inspiring China's scientific community, and will bring new value, science and impetus to astronomy and space exploration, *Astronomy Magazine* added.

## Comment

## Geopolitics Must Not Block Sci-tech Cooperation

Edited by QI Liming

A short-term extension of the U.S.-China *Science and Technology Agreement (STA)* expires this February, and Denis Simon, affiliated with the Institute for China-America Studies, told *South China Morning Post* on February 2 that as a consequence, the U.S. was "very concerned" about American scientific personnel being detained or not being able to return home from China. Although this statement seemed to signal the legitimate concerns arising from the lack of renewal of the agreement, in reality, it cannot stand up to scrutiny and is groundless.

China has long welcomed communication and exchanges with the U.S., but the U.S. has long maintained a hegemonic mindset in its dealings with China. In Washington, being "anti-China" seems to have become a form of political correctness, and sci-tech cooperation has not been immune to manipulation by U.S. politicians.

Actually, sci-tech cooperation between China and the U.S. should be a positive move for the two major economies to benefit the future of humankind. In this regard, for more than 40 years, the STA has been the largest cooperation mechanism between the two countries in the field of science and technology. Naturally, this mechanism is not only beneficial to China, but a mutually beneficial framework between the two sides.

As for the renewing of the STA, Nicholas B. Dirks, president and CEO of The New York Academy of Sciences, said that geopolitics should not get in the way of scientific cooperation with China. "From my perch as president and CEO of The New York Academy of Sciences, I strongly believe that it is in the interest of global science to advocate for the agreement's full renewal," he said.

Renewing the agreement is not just a nod to the past decades of fruitful collaboration, but also a commitment to a future where science, innovation and progress continue to thrive. It's a declaration that even in times of discord, the pursuit of knowledge and understanding remains a firm bridge between nations, said Dirks.

Meanwhile, Simon said the fact that the U.S. is now "Talking about de-

linking from China, or de-risking, a popular word right now, when China has something meaningful to offer us, is ironic." A new version of the STA, in which there was a shared vision, could yield a one plus one equals three outcome; a synergy in which both countries could benefit, said Simon.

"I do not know of any global challenge problem, including climate change, global pandemics, etc., that can be solved in any kind of meaningful way without the direct cooperation and collaboration between the U.S. and China," he added.

Since its inception in 1979, the STA has laid the groundwork for an unparalleled exchange of knowledge, talent and resources between two countries that are scientific powerhouses. Collaboration enables scientists from different nations to pool their expertise and resources, thereby accelerating the pace of discovery. This benefits all of humanity and should be at the heart of any decision on renewing the STA.

Science and technology have always thrived on the exchange of ideas, cross-border collaboration and the free flow of information. Attempting to isolate nations from one another's scientific pursuits will stifle progress, hinder innovation and hamper our collective ability to tackle global challenges, said Dirks.

Incomprehensibly, Chinese students arriving in the U.S. were denied entry without probable cause every month for the past few months. On January 28, the Chinese Embassy in the United States celebrated the 45th anniversary of China-U.S. student exchanges and the 2024 Spring Festival Gala for Chinese and American youth. Speaking at the event, the Chinese Ambassador Xie Feng to the U.S. said that scientific progress can only be achieved when the brightest minds are brought together. "The dynamism of thought springs from mutual learning, and scientific progress would be impossible without exchanges," said Xie.

All in all, hegemonism and geopolitics should not become the roadblock to sound sci-tech relations. Despite differences in ideology and political systems, the pursuit of scientific knowledge, understanding and solutions transcends borders and obstacles. This is the call from scholars and scientists around the world.



Chinese Embassy in the United States holds a gala to celebrate the 45th anniversary of China-U.S. student exchanges and the Spring Festival for Chinese and American youths. (PHOTO: XINHUA)

## Opinion

## 'Visa-free Era' Shows China Opening up More

By TANG Zhexiao

With the 30-day mutual visa exemption between China and Singapore taking effect for ordinary passport holders on Chinese Lunar New Year's Eve, China is implementing unilateral and mutual visa-free policies for a larger circle of friends, ushering in a "visa-free era" that includes more and more countries.

According to the National Immigration Administration's estimation, the Chinese mainland has seen a daily average of 1.8 million inbound and outbound passenger trips during the

Spring Festival holiday this year, nearly 3.3 times larger than last year's figure.

Data from Fliggy, China's leading online travel platform, showed that outbound travel bookings during the 2024 Spring Festival holiday hit a four-year high, surging almost 10 times year-on-year.

From December 2023, citizens of France, Germany, Italy, the Netherlands, Spain and Malaysia were allowed visa-free entry to China for up to 15 days.

In January 2024, along with the five European countries, Irish and Swiss nationals will now be allowed to enter China without a visa.

The trial program will be effective for one year, with the aim of "encouraging more people to visit for business and tourism," the Associated Press reported.

According to the data from China's Ministry of Foreign Affairs, China has signed mutual visa exemption agreements with 157

countries to date, covering different types of passports, reached agreements or arrangements to simplify visa procedures with 44 countries, and enjoys comprehensive mutual visa exemption with 23 countries, including Thailand, Singapore, the Maldives and the UAE. In addition, over 60 countries and regions offer visa-free or visa-on-arrival policies to Chinese citizens.

All these measures increasingly make Chinese citizens' outbound trips easier, and help foreigners travel, work, study and live in China more conveniently, and are being well received by the international community.

According to Euronews, last year saw a surge in interest in China as a tourist destination among Europeans. Data from Chinese online travel agency Trip.com showed a 663 percent increase in overall bookings from Europe to China compared to 2022.

The visa-free era is also generating positive effects. "Greater opening-up measures would shore up confidence and encourage investment in the country at a time when both are highly sought after," said the *South China Morning Post*.

In a statement, the EU Chamber of Commerce in China called the move a

"tangible and practical improvement which will also increase business confidence," with the hope that more European nations would be given visa-free access soon.

Josep Maria Gomes, an international business developer with the Barcelona Chamber of Commerce in Spain, said that China has always been a focus, "That's always in our internationalization plans. It's not only a country with great potential, [being ahead of us] in some technologies, but a country where our companies must seek [a] presence," he said.

Meanwhile, the executive director of the UN World Tourism Organization said that China's visa-free policies will help the global tourism industry recover and China's booming tourism industry will lead neighboring countries to prosper together.

Improving visa policies and facilitating cross-border travel is an important measure, through which the diplomatic service contributes to China's high-quality development and high-level opening-up. This brings more opportunities for deepening friendly exchanges and mutually beneficial cooperation between China and other countries, said China's Ministry of Foreign Affairs.



Chinese tourists from Shanghai arrive at South Korea's Jeju International Airport during the Spring Festival holiday on February 8. (PHOTO: VCG)

## First Chinese Reference Genome Sequenced

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## Choosing appropriate sample

In 2020, Gao assembled a team in Shanxi to develop a Chinese genome reference.

Selecting the appropriate samples marked the initial and crucial phase for the research team. The aim of crafting a Chinese-specific genome is to better serve contemporary medical practices, so the samples need to better represent the genomic characteristics of modern Chinese. As a result, the team picked a healthy male Han Chinese as

a sample.

Kang Yu, a member of the research team, emphasized the importance of the sample, saying, "It would better represent the modern Chinese genetic traits." T2T-YAO was designated as the project's primary focus, so the team decided to start with the Han Chinese, the largest ethnic group in the nation.

The team's choice was influenced by a historical belief held by many Chinese, both domestically and abroad, concerning their ancestral migration

600 years ago. The majority of the T2T-YAO is characterized by East Asian populations according to ancestry analysis. "We are confident that the genome will serve as an accurate representation of the contemporary Han Chinese population," said Gao.

T2T-YAO showed significant differences between the Chinese and European genomes. When compared with the newly released human reference genome T2T-CHM13 by the T2T Consortium in 2022, the comparison disclosed variances in 11 percent of

the sequences and 5 percent of the genes.

Chen Runsheng, an academician at the Chinese Academy of Sciences (CAS), highlighted that the unveiling of the complete Chinese genome sequence will change the previous perception that genetic variances among various human populations only differ by one-thousandth of a percent.

## T2T-YAO release within just two years

The Human Genome Project (HGP) took three decades of work to obtain

the complete haploid human genome sequence, including the Y chromosome, but T2T-YAO was completed within just two years.

Assessed by Merqury, the number shows that the quality value of T2T-YAO is better than T2T-CHM13. Moreover, T2T-YAO is the inaugural diploid genome, containing both sets of chromosomes, inclusive of the Y chromosome.

"The reason we could assemble T2T-YAO so fast is thanks to rapid advances in DNA sequencing and splic-

ing technology, as well as the accumulation of a great deal of technological advancement and theoretical knowledge, including HGP," said Kang.

"Moving forward, we will conduct further parsing and annotation of T2T-YAO, so that it can be better used in clinical settings," said Kang. He hopes to pioneer sequencing techniques, genomic analyses and diagnostic tools based on an indigenous reference genome to better serve Chinese people, and to promote the development of new drugs in the future.