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SPACE TREK

China on track with its
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SHARING THE PIE IN THE SKY

Space industry players urge cooperation for global and generational benefits

By Li Qing

Since Soviet Union astronaut Yuri Gagarin became the first person to fly in space in 1961, the exploration of the universe has changed stupendously. In 2001, Dennis Tito, a U.S. billionaire, reportedly paid \$20 million for an eight-day trip in space, becoming the world's first space tourist.

Although the price of a seven-to-nine-day space trip has since jumped to \$57 million, the global space travel market still has a huge demand, Wu Ji, a researcher with the National Space Science Center of the Chinese Academy of Sciences, said at a workshop on China-U.S. commercial space dialogue during the China Space Conference held in east China's city Nanjing on April 25.

The workshop was jointly organized by three NGOs from China and the U.S.—the Chinese Society of Astronautics, Caelus Foundation and the Secure World Foundation.

American spaceflight company Virgin Galactic, one of the first to jump into the fray, said early last year that it had nearly 8,000 online registrations of interest from 60 countries and territories. At that time, the plan was to launch its first commercial space tourism flights in 2021, with a 90-minute journey to cost \$250,000. However, the launch

was postponed to “early 2022” and since then, there has been no update.

“The service will be initially accessible to those with immense wealth,” Wu said. “But in the future, space tourism should be affordable for the rich, if not the middle-income group.” He hoped that with the development of the industry and technology, Chinese companies will also capture a slice of the international space tourism market. “Commercial programs can help lower costs and improve the efficiency of space activities, which will also benefit the traditional players in this area,” he said.

A nascent sector

However, unlike the U.S., which has veteran companies exploring

space such as Elon Musk's SpaceX, established as early as in 2002 with the goal of establishing colonies on Mars, China's commercial space industry is still in the primary stage, Zhao Qiming, a researcher with the Third Institute of China Aerospace Science and Industry Corp. (CASIC), said.

A white paper on China's space activities released in 2017 stressed the importance of non-governmental capital in space-related activities, including research and production, space infrastructure, information products and services, and satellite application, to enhance the commercialization of the space industry.

During the 14th Five-Year Plan (2021-25) period, more space infrastructure will be built, and the capability of commercial space systems enhanced, integrating them into major national development strategies, Fu Zhimin, chief engineer of CASIC, said at a forum on April 26.

Development of the commercial space sector will also boost strategic emerging sectors such as the digital economy, intelligent manufacturing and new materials.

“China will enhance international cooperation and

“We are one global community when it comes to space, which is a global marketplace facing a regulatory challenge. I think it is our responsibility to address all of these issues together and to try to resolve them so the future generations will have access to space in the same way that we do.”

—Richard Dalbello, Vice President of Global Engagement, Virgin Galactic



Richard Dalbello, Vice President of Global Engagement, Virgin Galactic, addresses a workshop via video link during the China Space Conference in Nanjing, Jiangsu Province, on April 25

provide more commercial space services to global users,” Fu said.

Over 200 companies dealing in rockets, satellites and their applications have emerged in China in recent years. The industry has seen much progress, including activities expanding from low-Earth orbit to outer space and integration of aerospace and marine engineering technologies. Besides government support, technology breakthroughs achieved in the past decades by traditional institutions provide the foundation for emerging players such as China Rocket Co.

Set up in 2016, China Rocket provides flexible and economical launch services such as the Jielong series of indigenously manufactured rockets that operate at competitive costs. Notably, the company is also improving its sea launch technology and running research and development of reusable rockets.

The Chinese launch sites are mostly in deserts or among mountains, which increases transportation costs and reduces commercial efficiency. With sea launches, commercial rocket companies can integrate manufacturing and launch.

Jin Xin, Vice President of China Rocket, said local governments are showing great interest in the space industry. However, more support from the Central Government in policies, funds, and taxation is still needed. “In return, the industry will promote local economic development,” he said.

China’s commercial aerospace industry needs an improved supply chain with a better business model,

Zhao said, adding that technologies and products with significant innovation should be developed.

Global blueprint

A recent article published by CNN, *Why China’s Space Program Could Overtake NASA*, said that the space race in the 21st century is not so much between governmental activities but between the Chinese and U.S. commercial space industry. The competition has “already emerged in low-Earth orbit, [and] will extend to Moon and eventually Mars in the coming decades,” it predicted.

Richard Dalbello, Vice President of Global Engagement, Virgin Galactic, said competition in space is inevitable as technology advances. But cooperation is necessary as there is still a substantial amount of work to be done by governments and others working in commercial space.

With all of these new technologies, some of the older issues are also harder to address, he said, citing the allocation of global spectrum

for communication and growing space debris, which is increasing the potential risk for spacecraft, international space stations and manned space activities.

“We are one global community when it comes to space, which is a global marketplace facing a regulatory challenge. I think it is our responsibility to address all of these issues together and to try to resolve them so the future generations will have access to space in the same way that we do,” Dalbello said.

Zhao echoed him, saying space resources belong to all; so cooperation is the best way to harness them. He proposed building a shared mechanism with a satellite constellation that can be customized according to different demands. It can be managed jointly with profits shared by the companies from different countries that build it.

“With more companies sharing the cost, it will be less expensive to operate and benefit more people. The lower cost will inject impetus into quality infrastructure construction, which will form a virtuous cycle,” he said.

Some U.S. companies still have a stereotyped idea that China’s commercial aerospace industry is a completely different business and that the role of the government, business models and even the definition of “commercial” are different from those in other countries.

Wu said China’s industry is developing in the same way as in the rest of the world, comprising an emerging corporate sector with fierce competition, government support, participation of capital, and promising players. **BR**

(Reporting from Nanjing, Jiangsu Province)



COVER STORY

SKY ROCKETING

Private rocket developers in China have taken off, embarking on a long march By Yuan Yuan

The carrier rocket CERES-1 developed by company Galactic Energy blasts off from the Jiuquan Satellite Launch Center in Gansu Province on November 7, 2020

Chinese private rocket developer, i-Space has successfully completed a test run on a new engine it hopes will power its next test rocket later this year. The breakthrough was made on April 26, just three days before China's launch of *Tianhe*, the core module for its first permanent space station *Tiangong*.

While visually less spectacular than the launch of *Tianhe*, the i-Space test run was important for the company as it prepares for its next attempt to send a rocket into orbit. This will be the company's third such attempt since its establishment in October 2016. Its first, in July 2019, was successful; however, its second in February this year, was not.

These attempts have placed i-Space in the national spotlight. Prior to its successful launch in 2019, two other Chinese private rocket developers had tried and failed, making i-Space the first Chinese private space firm to send a satellite into orbit, and marking a milestone for China's commercial space industry.

The success in 2019 has instilled confidence in China's private rocket developers and in turn helped the company to secure more investment. One year after that launch, another private Chinese company, Galactic Energy, was also able to successfully launch a satellite with its own rocket.

While the company's failed launch in February might have dampened some of the enthusiasm in China's private rocket industry, it hasn't hindered the company's preparations for the upcoming launch later this year.

New space players

Aerospace had been a government-funded undertaking in China until 2014, when it gave the green light for private companies to participate in aerospace development. In 2016, the National Development and Reform Commission as well as the State Administration of Science, Technology and Industry for National Defense released more detailed plans for the opening of the industry to private companies.

These plans were a stimulus for rapid development of the industry, inspiring some aerospace experts to establish aerospace firms, with many choosing to start firms focusing on the development of satellites. Satellites need be sent into orbit by rockets, yet currently, the cost of launching satellites is mostly higher than that of developing them, hindering the development of the industry.

Peng Xiaobo, founder of i-Space, which is also known as Beijing Interstellar Glory Space Technology, used to be a rocket designer at the China Academy of Launch Vehicle Technology. He established i-Space after seeing a market for commercial rockets. At that stage, there were already private rocket developers in China, who were working to raise funds and make maiden launches.

"There were two reasons why investors were hesitant to invest in this industry during its early stages," said Li Xin, a Beijing-based investor. "One is that many investors were not familiar with aerospace technology, and the other is that the industry had long been run by the state, so it was difficult to obtain sufficient data to estimate market performance."

Founded in October 2016, i-Space didn't receive its first investment until August 2017. In 2018, two rocket launch attempts respectively by two other companies, OneSpace and LandSpace,

both failed, creating a gloomy atmosphere around the industry. But the successful launch by i-Space in 2019 marked a turning point in public perception. The rocket, Hyperbola-1, carried two satellites and three additional payloads into orbit at an altitude of 300 kilometers, making i-Space the third in the world to do so after SpaceX and Blue Origin from the United States.

“When talking about rocket developers, many would think of Elon Musk,” said i-Space Vice President Huo Jia. “Musk’s company SpaceX was founded in 2002 and achieved orbit in 2008. We cut that process to less than three years.”

Galactic Energy was established in 2018 and followed i-Space to become China’s second private space firm to successfully achieve orbit in November 2020. The company’s founder, Liu Baiqi, was previously an associate professor at Beihang University, formerly known as Beijing University of Aeronautics and Astronautics.

“Each company has different

intentions in launching its first rocket,” Liu said. “For Galactic Energy, launching a rocket was just the start of a long march. The goal of our private rocket developers is to lower launching cost by developing reusable carrier rockets.”

The layout

In late 2018, LandSpace opened China’s first privately owned carrier rocket factory in Huzhou, a city in Zhejiang Province. With the factory, the largest of its kind in Asia, LandSpace is about to mass produce rockets.

LandSpace plans to launch its ZQ 2 rocket this year, and begin mass producing the rocket and its engines in the near future. According to Zhang Changwu, founder of LandSpace, starting from 2022, the plant will be able to produce 15 ZQ 2 rockets and 200 engines per year.

To fund the ZQ 2 program, LandSpace raised 1.2 billion yuan (\$175 million) in its 2020 round of financing, the largest ever fundraising event in China’s private space industry.

The development of the private rocket companies has also received support from local governments in China. In September 2020, Galactic Energy signed an agreement with the government of Jianyang, a county-level city under the administration of Chengdu, Sichuan Province, to construct a base there.

The base in Jianyang, with a planned total invest-

ment of about \$225 million, will be used for research, development and production of liquid propellant rocket engines for Galactic Energy’s Pallas series of launch vehicles.

Other public-private partnerships include a major commercial aerospace base in Wuhan, capital city of Hubei Province in central China, and a coastal facility for sea launches and launch vehicle production in the eastern province of Shandong.

“Besides the United States and Russia, China is the only country in the world that has an entire industrial chain of rocket manufacturing,” Huo said. “This is our advantage.”

In January, i-Space was reportedly planning to conduct an initial public offering in the science and technology-focused science and technology innovation board in Shanghai. If the listing goes smoothly, it will become the first commercial rocket firm listed on the market in China.

It is estimated that at least 3,000 Chinese commercial satellites are waiting to be carried into orbit and this number will increase in the following years with the growing demand for satellite service.

Wang Yanan, Chief Editor of *Aerospace Knowledge* magazine, suggested major private commercial aerospace enterprises seek participation in more projects, such as the construction of space stations, and Moon and Mars exploration, for more sustained development. “The participation of China’s commercial aerospace enterprises will help the sector make advances in many aspects such as cost control, decision-making efficiency and adapting to new technological changes,” Wang said. **BR**



Rocket models stand in the carrier rocket factory of LandSpace in Huzhou, Zhejiang Province, on May 26, 2020

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