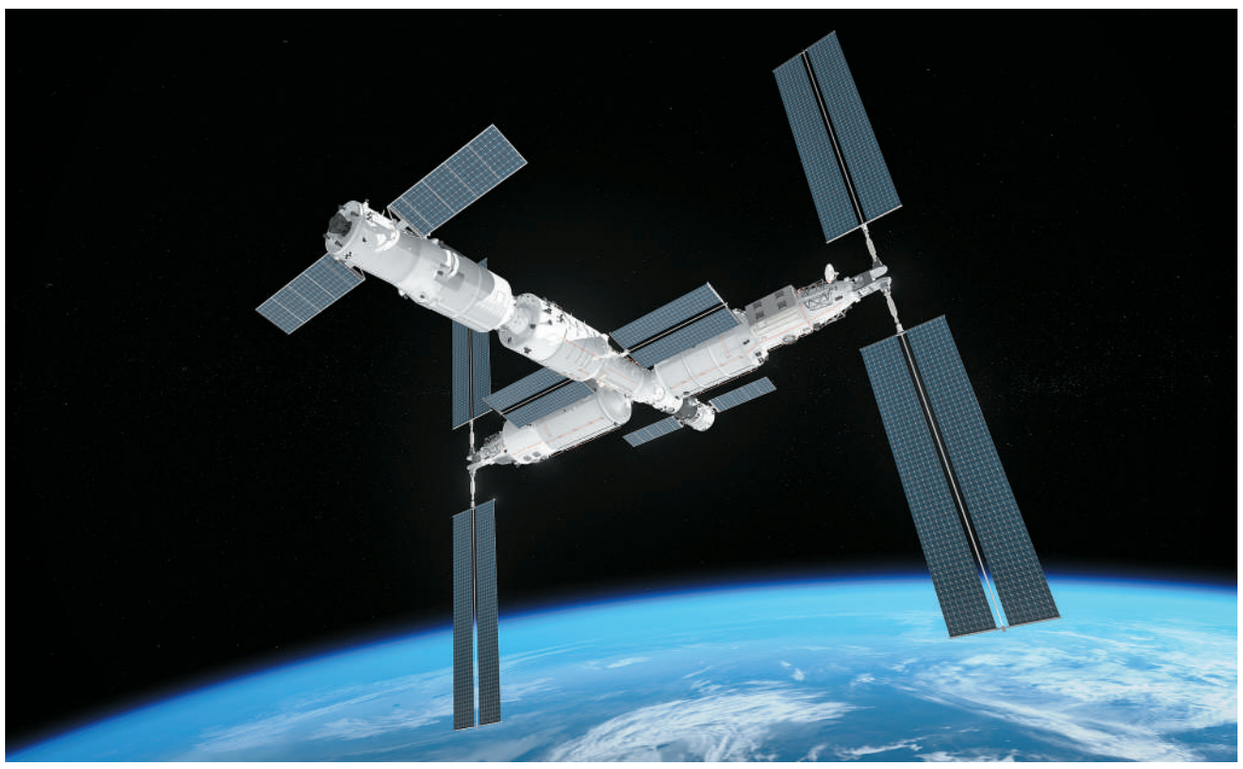
Reliable, Open to Sharing: China Space Exploration

Voice of the world

Edited by QI Liming



China Space Station. (PHOTO: VCG)

2021 is widely regarded as the best year for space launches in China. There had been forty launches by the end of October, which is already one more than last year.

According to *South China Morning Post,* China has invested heavily in space programs in recent years and made significant progress.

Before 2007, the country had never carried out more than 10 launches in a year. But since then it has gathered momentum, firing off 152 launches in the past five years, more than any other country.

Major achievements since this October

The Shenzhou-13 astronauts aboard the China Space Station (CSS) took the first spacewalk of their mission on November 7, marking the country's first spacewalk by a female astronaut.

Meanwhile, China launched a sustainable development satellite SDGSAT-1 to study Earth from space on November 5. The satellite will observe interactions between human activities and nature. Being developed by the Chinese Academy of Sciences (CAS), it is the world's first scientific satellite dedicated to the UN 2030 Agenda for Sustainable Development.

A Shijian-21 satellite was also launched on October 24. The satellite will be mainly used to test and verify space debris mitigation technologies.

Long-term impact of Shenzhou-13 mission

The Shenzhou-13 astronauts arrived safely and have settled into the Tianhe, including opening the hatch of the Tianzhou-3 cargo spacecraft for their supplies.

Dr. Namrata Goswami, an independent scholar on space policy, great power politics and ethnic conflicts, told *The Diplomat* China's aim is to build space logistics and capacity for a permanent presence, first in Low Earth Orbit, and then in space between the Earth and the Moon.

In addition, Shenzhou-13 displayed a logistic chain of space infrastructure that includes the core module, Tianhe, and the cargo spacecraft Tianzhou-2 and Tianzhou-3. Shenzhou-13 is a step forward toward building capacity for larger space stations, said Goswami.

Platform for further international cooperation

Cooperation has already begun between China and some other countries for selection and training of astronauts. The China Manned Space Agency is working with the UN Office for Outer Space Affairs to invite certain UN members for scientific experiments at the Tianhe space station module.

China also sells launch services abroad, said Richard Bitzinger, a U.S.-based visiting senior fellow at the S. Rajaratnam School of International Studies in Singapore. "China is reliable, and open to sharing technology," he said. Bitzinger also said partner nations might see joint space exploitation as a "logical next step."

The CSS is likely to do "thousands of experiments" in micro-gravity and could accept countries unable to reach the International Space Station, said Marco Cáceres, director of space studies at the Teal Group market analysis firm.

More Sino-foreign space cooperation

According to the comments released on online portals, China is extending its space program step by step.

"My sense is that this is a good opportunity for China to seek international cooperation," said Cáceres.

China is putting in much effort to assist the countries in need.

The Voice of America, said that China builds high-end satellites for developing countries and shares satellite data to help with relief work after natural disasters.

China offered Japan remote sensing data after its 2011 tsunami and had given images to Australia for wildfire damage surveys, said Yun Sun, co-director of the East Asia program at the Stimson Center in Washington DC. Chinese satellites have provided free earth imagery to developing countries, she added.

"It sounds like the data collected by these satellites are quite a popular or needed data for many countries," said Sun. "So, for developing countries who don't have access to commercial satellites, or to information shared by Western countries, then China provides a useful alternative."

As of 2008, China has signed space-related cooperation agreements with Argentina, Brazil, Canada, France, Malaysia, Pakistan, Russia, Ukraine and the European Commission. Last year, Pakistan became a partner eligible to use the BeiDou navigation satellite.

China is endeavoring to be the pioneer in space collaboration, space power projection, space technology demonstration, and deep space exploration and utilization, striving to make outer space exploration a reality.

Hi! Tech

All-climate Battery Adopted by Beijing Winter Olympics

Edited by QI Liming

An all-climate battery has been adopted by the 2022 Beijing Olympic Winter Games as one of the core technologies to power its Olympic electric vehicles.

The all-climate battery is also the thermally modulated battery designed for electric vehicles without range anxiety and has unsurpassed safety, low cost, and contains no cobalt.

Chao-Yang Wang, leader of the research team at Pennsylvania State University, was looking for a battery with a controllable interphase and finally invented the all-climate battery.

According to Wang, without increasing the flammability of the electrolyte or changing the thermal stability of the electrode material, a piece of nickel foil with a thickness of 10 microns is implanted inside the battery to act as a heating element. Then the one end is attached to the negative terminal and the other is extended outside the cell to create a third terminal.

When electrons flow, it rapidly heats up the nickel foil through resistance heating and warms the inside of the battery. Once the battery's internal temperature gets to 60° C, the switch opens and the battery is ready for rapid charge or discharge.

Using a switch, the activity of the battery can be adjusted at will. For a battery completely frozen in an environment of minus 30°C, it only takes 30 seconds to self-heat to above zero degrees and function normally.

Wang's team modeled this battery using existing technologies and innovative approaches. They proposed that using this self-heating method, they could use low-cost materials for the battery's cathode and anode and a safe, low-voltage electrolyte.

The cathode is thermally stable, lithium iron phosphate, which does not contain any of the expensive and critical materials like cobalt. The anode is made of very large particle graphite, a safe, light and inexpensive material.

The batteries have a range of 250 miles, with the ability to charge in 10 minutes. The key to long-life and rapid recharging is the battery's ability to quickly heat up to 60°C, for charge and discharge, and then cool down when the battery is not working.

The 10-minute fast charging battery will become an important milestone in the development of electric vehicles, said Wang.

Online Dual-carbon Brain to Reduce Carbon Emissions

By Staff Reporters

An innovative "dual-carbon brain" that is a data system for monitoring and analyzing carbon emissions, was recently put online by the Shenzhen Power Supply Bureau (SPSB) of China Southern Power Grid. The system collects consumed power resource statistics, such as electricity, coal, gas and oil.

According to Lyu Zhining who is in charge of innovation and digital research at SPSB, a "dual-carbon brain" can give users information about energy consumption for targeted energy conservation.

Electricity consumption data of more than three million people can be collected by the "dual-carbon brain". The data could be actively put into the government digital exchange platform after classification and summarization, and help officials monitor carbon emissions from individuals and enterprises in real-time.

The production team has designed a carbon emission measurement model for the "dual-carbon brain" based on the government's carbon emission standards and calculation regulations. "Based on electricity consumption, the system can calculate the indirect carbon emissions of electricity. Using the number, combined with the fossil energy consumption value announced by the government in the previous year, the 'dual-carbon brain,' can evaluate fossil energy's total direct carbon emissions and carbon emissions," said Lyu.

Dual carbon brain. (PHOTO: SPSB)

Wang Chengsi, deputy director of application support department of SPSB's information Center, said that the system will provide multiple services such as energy consumption detection, index display, and problem location. Meanwhile, it may become a significant system to provide energy consumption monitoring and consulting services for public service institutions and other industrial parks. It helps enterprises and institutions reduce operating costs.

Top 10 Scientific Issues of Human Society Development Unveiled

By TANG Zhexiao

A list of the top 10 scientific issues related to shared global challenges and deeply affecting social development was released during the Third World Science and Technology Development Forum in Beijing recently.

Focusing on the UN 2030 Agenda for Sustainable Development, the top 10 scientific issues are related to three fields, namely ecology, medical treatment and information.

"Selecting and publishing the top 10 scientific issues will help strengthen the global sci-tech exchanges and pool the wisdom and strength of global scientists, in order to promote the realization of the UN Sustainable Development Goals," said Guo Huadong, academician of the Chinese Academy of Sciences.

The ecological issues included:

- establishing a nature-based circular economy
- relationship and feedback mechanisms between climate change and biodiversity loss
- achieving carbon neutrality while maintaining the ecosystem and protecting biodiversity

The medical issues included:

- pathological mechanisms of major diseases and the early diagnosis strategies
- using data and information technologies to control pandemics
- remote AI diagnosis expert transforming the traditional medical system

The information issues included:

- the information processing mechanism of the human brain
- digital revolutions changing the sustainable development model of human society
- the impact of information dissemination and trust machine (a holistic approach to microfinance) on human society structure
- ensuring personal privacy and security

Julian Young, president of the Institution of Engineering and Technology, said global warming and other ecological problems require urgent and effective responses, which no countries or societies can tackle them alone. He wishes that scientists worldwide can cooperate with each other and find the best solution for shared goals.

Based on the search results of the database Scopus and INSPEC, the top 10 issues were selected and voted worldwide. Scientists from more than 10 countries and regions including China, the United States, the United Kingdom and Canada have participated in the selection.

China and U.S. Declaration on Climate Action Welcomed

Opinion

Edited by YU Haoyuan

On November 10, China and the U.S., the world's two biggest economies, announced that they will increase efforts on climate-related actions to meet the goals of the 2015 *Paris Agreement* goals in this decade, just days before the end of the COP26.

The declaration announced is an upgrade action for China and the U.S., recalling their *Joint Statement Addressing the Climate Crisis* of April 17, 2021. The move came as a major surprise to the world as the two countries are locked in several disputes in a range of other areas.

Both the China special envoy for climate change Xie Zhenhua, and U.S. special climate envoy John F. Kerry expressed that in the face of climate change, China and the U.S. can find common ground to cooperate.

"There is more agreement between the China and U.S. than divergence, making it an area of huge potential for cooperation," Xie said at a news conference. Speaking at a separate press conference, Kerry said, "Cooperation is the only way to get this job done."

Many observers considered the climate agreement to be a remarkable turnaround.

"While this is not a game changer the way the 2014 U.S.-China climate deal was, in many ways it's just as much of a step forward given the geopolitical state of the relationship. It means the intense level of U.S.-China dialogue on climate can now begin to translate into cooperation," said Thom Woodroofe, a former climate diplomat now serving as a fellow at the Asia Society Policy Institute working on China-U.S. climate cooperation.

Frans Timmermans, the EU climate policy chief, noted that the U.S. and China know that climate issues are much more important than most other issues. It could finally lead to a great result of helping boost negotiations at COP26.

In addition, the declaration will benefit not just COP26 negotiations, but also help promote global solutions on enviromental protection.

Laurence Wainwright, departmental lecturer at the University of Oxford's Smith School of Enterprise and the Environment, told *Forbes* that when these two largest economies, whose relationship has been rocky over the last decade, are ready to cooperate, it sends a powerful message to the rest of the world.

Critics say that several declaration details about the latest agreement are still unknown, but many world leaders and climate experts also "broadly welcomed the agreement," according to *The Guardian.*

Genevieve Maricle, director of U.S. climate policy action at World Wildlife Fund, said that the two nations, "Have the power to unlock vast financial flows from the public and private sectors that can speed the transition to a low carbon economy."

"Tackling the climate crisis requires international collaboration and solidarity, and this is an important step in the right direction," said UN Secretary-General António Guterres, who welcomed the effort and hoped the two countries would take action this decade.