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CHINA SCIENCE AND TECHNOLOGY REVIEW

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China Releases 2025 Research Front Report

An annual '2025 Research Front' report jointly released by the Chinese Academy of Sciences and Clarivate specifies that China continues to display a commendable performance in terms of research in science and technology disciplines. The report covers a total 128 Research Fronts i.e. clinical medicine, chemistry, agricultural sciences, physics, astronomy, biological sciences, environmental sciences etc. in which it identifies 110 'hot' Fronts and 18 'emerging' Fronts.

The report underscores that though the United States of America continues to lead research activities in broad areas of natural science and social sciences, the gap between China and the United States is narrowing. For instance, based on data from highly cited papers published from 2019 to 2024, the US ranked first in the research frontier in five fields i.e. Earth sciences, clinical medicine, biological sciences, astronomy and astrophysics and mathematics. On the other hand, China leads in the fields of agriculture, plant and animal sciences, ecology and environmental sciences, chemistry and materials science, physics, information science, as well as economics, psychology and other social sciences.

In the backdrop of growing intense research competition between China and the United States, the report underlined that "the trend of the US and China advancing side by side is becoming increasingly solidified" whereas the UK and Germany form the second tier.

On the significance of releasing such report annually, Emmanuel Thiveaud, vice-president of Clarivate, explained that it guides the direction of scientific research and informs policymakers, as "research comes with more process to envision the future of natural and social sciences by identifying the hot and emerging research areas." Thiveaud adds that artificial intelligence has become central to empowering several emerging research areas.

CNSA Open for Commercial Space Exploration

China National Space Administration (CNSA) unveiled a document, "Go Global", inviting space firms to use its facilities for commercial purposes and pursue international cooperation over the next two years. The document alludes to an invitation to commercial space enterprises as a means to help developing countries to build satellite-application industries. It also refers to an expansion of commercial access to its national network of civilian tracking, telemetry and control (TT&C) stations, data-receiving sites, calibration ranges and validation fields, as well as to large test assets such as rocket-engine test stands and space-environment simulation facilities.

For the commercial players, the document specifies that selection will be made

through open competition in order to take part in cutting-edge, key space programs, ranging from advanced propulsion and next-generation satellite platforms and payloads to integrated communications, navigation and remote-sensing applications. Further, the document underscored that the plan aims to achieve high-quality development of commercial space by 2027.

Scientific Collaboration Projects

To advance synthetic biology research, the Tianjin Institute of Industrial Biotechnology (TIB) of the Chinese Academy of Sciences and Belgium Vlaams Instituut voor Biotechnologie-Flanders Institute of Biotechnology (VIB) renewed their commitment by signing an agreement on 15 December in Tianjin, China. In an earlier agreement signed in December 2020, the two entities focused on yeast synthetic biology and the biosynthesis of plant natural products. However, the latest agreement will concentrate on accelerating cutting-edge research and platform technologies within synthetic biology. Expanded research priorities include the study of chassis cell metabolic mechanisms and regulatory networks, pathway design and dynamic regulation, microbial protein and natural product biosynthesis, and the valorization of low-carbon compounds.

With a successful launching of the United Arab Emirates (UAE) Arab Satellite 813 on 10 December from the Dongfeng Commercial Space Innovation Test Zone into the orbit by the Chinese Lijian -1 Y11 rocket, scientific collaboration between China and UAE achieved another milestone. The primary purpose of the satellite is to use advanced hyperspectral observation technology to provide high-precision data for environmental monitoring, resource exploration and scientific research.

UAE-Arab Satellite 813 is the first joint space project among Arab countries with Shanghai Engineering Center for Microsatellites (SECM) as a key Chinese partner in the project. In 2023, the UAE's National Space Science and Technology Center (NSSTC) signed a cooperation agreement with SECM and subsequently developed a high-performance hyperspectral satellite with optimized weight, volume and capabilities. Over 40 engineers from the United Arab Emirates University, along with other Arab researchers, participated in the satellite's development, gaining hands-on experience in aerospace system design, research and development, and testing.

Scientific Research Breakthroughs and Discoveries

In another milestone, the Chinese Academy of Sciences (CAS) Center for Excellence in Brain Science and Intelligence Technology, in collaboration with Huashan Hospital, affiliated with Fudan University, and other institutions, made progress in invasive brain-computer interface (BCI) technology. In a major advance during clinical trials, a

middle-aged man with quadriplegia caused by a cervical spinal cord injury is now able to steer a wheelchair outdoors and command a robotic dog to retrieve takeout food using only his thoughts. Previously, BCI technology was largely limited to "two-dimensional screen" tasks such as cursor control. In the latest breakthrough, the research team has advanced beyond that, moving patients from virtual screen interactions to performing "three-dimensional actions" in the real world.

China Science Diplomacy

Demonstrating the deepening of collaboration and talent exchanges between the two nations, the "China-Serbia Sci-Tech Exchange Event and Young Talented Scientists Roundtable on Green Steel Manufacturing" was held in Shijiazhuang, Hebei province, on 9 December under the theme "Empowered by Technology, Greening the Future." More than 100 representatives from governments, diplomatic missions, and industry, academia, and research institutions from China and Serbia participated in the event. Speaking at the event, Gao Xiang, Director of the China Science and Technology Exchange Center, underscored the need for concrete action to gather global wisdom and jointly explore the path of green industrial transformation, along with the implementation of diplomatic consensus reached by the heads of the state of China and Serbia. He hoped such exchanges would serve as an opportunity to continuously expand channels for exchange and cooperation, promote the close connection and deep integration of the innovation chain, industrial chain, and talent chain, and accelerate the transformation and application of relevant achievements.

To consolidate cooperation in science and technology between China and Mongolia, Prof. Jiang Song, Vice President of the National Natural Science Foundation of China (NSFC), held a meeting on 17 December with a visiting delegation led by Dr. Bat-Erdene Batnasan, Director General of the Mongolian National Foundation for Science and Technology (MFST). During the meeting, both sides reviewed the cooperation achievements between NSFC and MFST, and an in-depth discussion on establishing new funding channels, joint talent cultivation and addressing global challenges was carried out. In the meeting, Vice President Jiang Song underlined the role of the NSFC in building a new pattern of international cooperation at multiple levels through collaboration with scientific institutions around the world and assured cooperation in scientific and technological innovation with Mongolia. Dr. Bat-Erdene Batnasan, Director General of MFST, also expressed satisfaction with having a deep agreement with NSFC and proposed to revise the MoU signed in 2017 between NSFC and MFST.