

Bridging the Divide: It Is Time for a New Science Agreement With China

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OVERVIEW

For more than four decades, cooperation in science and technology, S&T, has been a cornerstone of U.S.–China relations, symbolized by the 1979 Bilateral Science and Technology Agreement, STA.¹ This agreement has provided the foundation for the two nations to collaborate on scientific discovery and technological innovation, benefiting both countries in unprecedented ways. The STA is an umbrella agreement — managed on the U.S. side by the Department of State — that provides a framework for bilateral cooperation in dozens of fields of scientific endeavor and necessarily involves dozens of counterpart government agencies in both countries.

In the STA's early years, China was primarily the beneficiary of American expertise and technology. That was somewhat by intention, as the United States' foreign policy goal was to support the emergence of a stable, modernizing China.² Today, China has emerged as a global S&T power. The United States stands to gain from sustained cooperation with China's increasingly robust and well-financed S&T ecosystem. Together, the United States and China can address critical global challenges, including climate change and pandemics, areas where both countries' expertise is vital. The rapid growth in China's scientific accomplishments, its rise as a leader in numerous key technological areas, and its emergence as the second-largest spender on research and development all provide new opportunities for the United States to benefit from China's S&T environment.

Some specific examples of STA cooperative projects and activities include:

- **Joint climate studies, including work on carbon capture, utilization, and storage:** These have led to technological advances in emissions reduction, which are useful for U.S. energy companies seeking to meet regulatory requirements on emissions. Such studies have also collected considerable atmospheric data, which have contributed to understanding urban air quality issues in U.S. cities.

¹ See "Agreement between the Government of the United States of America and the Government of the People's Republic of China on Cooperation in Science and Technology," signed January 31, 1979, *Treaties and Other International Acts Series* no. 9179, <https://www.state.gov/china-24-227>. The signatories were U.S. President Jimmy Carter and Chinese Vice Premier Deng Xiaoping.

² Amanda DeMarco, "From Collaboration to Controversy: The Origins of the 1979 U.S.–PRC Science and Technology Cooperation Agreement," 21st Century China Center, UC San Diego, September 30, 2024, https://china.ucsd.edu/files/21china-report_from-collaboration-to-controversy-sta.pdf.

- **Joint work on clean energy through the U.S.–China Clean Energy Research Center, CERC:** This has led to advances in battery storage, renewable energy grid design, and electronic vehicles.
- **Joint work on the Human Genome Project and other genetics research with the Beijing Genetics Institute:** This has led to advances in cancer genomics for cancer therapy, agricultural genomics for improving crop productivity, and other areas of personalized medicine and biotechnology.
- **Joint work on data science:** This has led to advances in natural language processing, computer vision, and robotics.
- **Joint work on materials science and semiconductor technology:** These advancements have bolstered U.S. industries and have been crucial for sectors like consumer electronics and renewable energy.³

Until 2023, the agreement had been renewed every five years since its inception in 1979, usually without much fanfare. The last time it was renewed was in 2018 during the first Trump administration. The agreement was deemed worthy of renewal because it provided continued access to China's rapidly improving research system and universities, enabling the U.S. to keep pace with the progress of China in various key fields. The 2018 renewal also added language regarding intellectual property, or IP, in order to protect the IP rights of American participants in bilateral projects.

³ This list is drawn from an extensive review of various U.S. government reports, media reports, and academic publications that focus on the operation and the outcomes of U.S.–China science and technology cooperation since 1979. These publications include the following: Richard P. Suttmeier, “Trends in U.S.–China Science and Technology Cooperation: Collaborative Knowledge Production for the Twenty-First Century?”, U.S.–China Economic and Security Review Commission, September 11, 2014, <https://www.uscc.gov/sites/default/files/Research/Trends%20in%20US-China%20Science%20and%20Technology%20Cooperation.pdf>; U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, *U.S.–China Science and Technology Cooperation (S&T Agreement): Report to Congress* (Washington DC, 2006), <https://2001-2009.state.gov/g/oes/rls/or/2006/96328.htm>; U.S. Library of Congress, Congressional Research Service, *U.S.–China Science and Technology Cooperation Agreement*, by Karen M. Sutter and Emily G. Blevins, IF12510 (2024), <https://crsreports.congress.gov/product/details?prodcode=IF12510>; Caroline S. Wagner and Denis F. Simon, “China’s Use of Formal Science and Technology Agreements as a Tool of Diplomacy,” *Science and Public Policy* 50, no. 4 (August 2023): 807–17, <https://doi.org/10.1093/scipol/scad022>; The White House, Executive Office of the President, Office of Science and Technology Policy, *Biennial Report to Congress on International Science and Technology Cooperation* (Washington DC, September 2022), <https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Biennial-Report-to-Congress-on-International-Science-Technology-Cooperation.pdf>; The White House, Executive Office of the President, Office of Science and Technology Policy, *Biennial Report to Congress on International Science and Technology Cooperation* (Washington DC, February 2024), <https://www.whitehouse.gov/wp-content/uploads/2024/02/2024-Biennial-Report-to-Congress-on-International-Science-Technology-Cooperation.pdf>; U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Office of Science & Technology Cooperation, *U.S.–China: Thirty Years of Science and Technology Cooperation* (Washington DC, October 15, 2009), <https://2009-2017.state.gov/e/oes/rls/fs/2009/130625.htm>; U.S. Government Accountability Office, *U.S.–China Cooperation: Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring*, GAO-16-669, (July 5, 2016), <https://www.gao.gov/products/gao-16-669>.

When the time came for the last renewal in August 2023, it was decided that a significant revision to the agreement was needed. The STA had become outdated in some ways, failing to address some central issues of concern, including data security, reciprocity, personal safety, etc. For the past year, the agreement has been extended two times while a renewal has been negotiated. At present, a revised version with substantial new guardrails remains unsigned. These guardrails include a significant emphasis on data security and personal security, narrowing the scope of fields involved, and more stress on reciprocity and equal access. The big question is whether the political will exists in both the United States and China to sign a new agreement and forge ahead with a series of new initiatives.⁴

The STA has strengthened scientific cooperation and elevated the quality of bilateral research, including practices around IP protection and research safety. Joint U.S.–China research efforts often produce higher-quality work than when each country operates independently. This collaboration has opened doors to discussions about IP protection, technology transfer, and innovation, in each case fostering a fairer, more transparent research environment for the users of those systems. The STA and its 40-plus protocols also provide critical insights into the state of science and technology in China, helping the U.S. scientific community better target the emerging pockets of excellence in the Chinese S&T system.

Despite the agreement’s proven value, there was opposition to renewing the STA from both the Biden administration and Congress. In June 2023, members of the House Select Committee on the Chinese Communist Party, CCP, recommended letting the agreement expire, raising concerns about the transparency of the outcomes it generated, especially regarding the ways in which some research cooperation may have indirectly assisted China’s military modernization.⁵ Many officials view the STA as inconsistent with American national security interests. In June 2024, the same House committee sent a letter to the U.S. Patent and Trademark Office, USPTO, asking for data on co-invented patents with China funded by the STA, since the USPTO had previously conducted such research in support of the Obama administration’s efforts to revise the agreement’s IP clauses.⁶ According to an August 2024 Reuters report, the USPTO responded by stating that, since 2010 until the first quarter of 2024, 1,020 U.S. patents had been filed with at least one China–based inventor and utilizing U.S. funding, at least in part. The response did not indicate the commercial value of these patents, but funding had come from a variety of U.S. government agencies, with the most — 356 — from the Department of Health and Human Services. The patents spanned a number of fields, including 197 in pharmaceuticals and 154 in biotechnology.⁷ Of course, this represents but a small portion of the

⁴ Mitch Ambrose, “Science Policy Outlook for the Second Trump Presidency,” American Institute of Physics, November 14, 2024, <https://www.aip.org/fyi/science-policy-outlook-for-the-second-trump-presidency>.

⁵ Mike Gallagher and Elise Stefanik, “Letter to Secretary Blinken on Science and Technology Agreement,” Select Committee on the CCP, U.S. House of Representatives, June 27, 2023, <https://selectcommitteeontheccp.house.gov/media/letters/letter-secretary-blinken-science-and-technology-agreement>.

⁶ Michael Martina, “U.S. Lawmakers Seek China Patent Data amid Science Pact Talks,” Reuters, June 12, 2024, <https://www.reuters.com/world/us/us-lawmakers-seek-china-patent-data-amid-science-pact-talks-2024-06-12/>.

⁷ Michael Martina, “Exclusive: U.S. Government Funding Yielded Hundreds of Patents for China-Based Researchers,” Reuters, August 29, 2024,

number of patents filed in either country, with 518,634 in the U.S. in 2023 and 1.64 million in China.⁸

Several academics have written articles on the qualitative improvements in scientific publications that derive from bilateral cooperation, as well as the adverse impact of bilateral tensions on scientific collaboration.⁹ We believe that a termination of the STA could adversely affect the quality of U.S. science.

We believe, along with many other professors and experts in innovation, that a renewed STA — updated to meet current evolving data and security challenges — is essential for the U.S. and China, both economically and scientifically. A revised “version 2.0” of the STA could even serve as a model for other countries negotiating science cooperation agreements with each other and with China, including such mechanisms as providing additional safeguards to protect confidential information, allowing for the periodic review of technological achievements, clearly defining ownership of S&T accomplishments, and creating opportunities for private sector participation, as the U.S. currently does. Improving third-party agreements in this way would also benefit U.S. economic and national security.

WHY THE STA IS STRATEGICALLY VITAL

1. **Strategic Value of Collaboration:** Collaborative research has led to significant advancements in fields such as biotechnology, climate science, and renewable energy. By pooling expertise, resources, and knowledge, the U.S. and China have addressed complex transnational challenges that neither country could solve alone. Whether combating pandemics, researching clean energy, or exploring space, the joint efforts of these two nations have proven essential for overall global progress. Without the STA, these critical collaborations could falter, leaving both nations less equipped to tackle the challenges of the future.¹⁰
2. **Mutual Learning:** Historically, China was viewed as a developing country benefiting from U.S. expertise, but the dynamic has shifted. China’s rapid rise in S&T has made it among the global leaders in fields such as artificial intelligence, quantum computing, and renewable energy. Today, the U.S. can learn from China’s advancements just as China once benefited from American expertise. In 2024, China ranked 11th on the Global

<https://www.reuters.com/world/us-government-funding-yielded-hundreds-patents-china-based-researchers-2024-08-29/>. The 1,020 patents granted also included 92 from the Pentagon, 175 with funding from the Department of Energy, and four from NASA. There were no suggestions made that Chinese researchers violated any U.S. laws or regulations regarding the specific know-how in question.

⁸ “World Intellectual Property Indicators Report: Global Patent Filings Reach Record High in 2023,” World Intellectual Property Organization, November 7, 2024, https://www.wipo.int/pressroom/en/articles/2024/article_0015.html.

⁹ Caroline S. Wagner, Lin Zhang, and Loet Leydesdorff, “A Discussion of Measuring the Top-1% Most-Highly Cited Publications: Quality and Impact of Chinese Papers,” *Scientometrics* 127 (2022): 1825–39, <https://doi.org/10.1007/s11192-022-04291-z>.

¹⁰ Yasheng Huang, “Why U.S.–China Relations Are Too Important to Be Left to Politicians,” *Nature*, July 23, 2024, <https://doi.org/10.1038/d41586-024-02385-7>.

Innovation Index, placing it among the top-tier of innovative nations.¹¹ China is now the world's second leading spender on scientific research and development.¹² Renewing the STA allows for greater sustained mutual benefit and exchange because of the evolving parity between the two nations.

3. **Addressing Global Challenges:** The world faces urgent issues that require coordinated international efforts. Climate change, for example, can only be effectively addressed through multinational cooperation, with the U.S. and China playing pivotal roles as the two largest carbon emitters. Similarly, global health crises like COVID-19 have underscored the need for sharing scientific expertise and data. A renewed and revised STA would streamline cooperation in these critical areas, facilitating faster responses to global threats.
4. **Economic and Technological Competitiveness:** The STA has been instrumental in enhancing technological competitiveness by allowing U.S. scientists and researchers access to China's rapidly growing, talent-rich innovation ecosystem. With China now a major player in sectors like telecommunications, artificial intelligence, and genomics, a collaborative approach allows the U.S. to stay engaged in developments that are shaping the future of the global economy. Isolating U.S. researchers from these advancements risks their falling behind in fields where China is taking the lead.

KEY REFORMS FOR AN STA 2.0

It has been clear for many years that the STA was becoming increasingly obsolete in terms of its ability to address the prevailing array of new issues that were becoming more central to the bilateral U.S.–China S&T relationship. For example, matters such as data security and personal security became pressing matters with the onset of the first Trump administration. It was only in 2023, however, that the idea of significant revision was given ample consideration. To ensure that a revised STA fully addresses the key concerns of both the U.S. and China — including concerns about potential national security, data security, and IP protection issues for the U.S. — the following adjustments and additions ought to be considered:

1. **Addressing Legal and Regulatory Gaps:** An updated STA must address the complex legal environments in both countries. Previous agreements often failed to account for Chinese regulations regarding IP rights and technology transfer, which denied, in general, any foreign ownership of technology developed in China. Moving forward, the U.S. should ensure that regulations on IP ownership and technology transfer are more equitable and transparent. In fact, the STA itself had been an important catalyst for reforms in this area in the past. A revised STA 2.0 should set clear guidelines for co-developed technologies, ensuring U.S. interests are protected, and monitoring how these technologies are disclosed and used.

¹¹ Aaron Wininger, "WIPO: China Ranks 11th in the Global Innovation Index," *China IP Law Update*, October 4, 2024, <https://www.chinaiplawupdate.com/2024/10/wipo-china-ranks-11th-in-global-innovation-index/>.

¹² Gong Qian, "China's Emergence as World's R&D Center," *Science and Technology Daily*, August 22, 2024, https://www.stdaily.com/web/English/2024-08/22/content_216463.html.

2. **Advancing U.S. Policy Priorities:** The renewed STA should reflect U.S. policy priorities in cutting-edge fields like artificial intelligence, biotechnology, and data security. Given existing transparency issues across China's regulatory environment, a renewed S&T cooperation agreement can offer important insights into Chinese scientific developments and how these developments might impact global competition. Furthermore, the agreement must address issues like IP theft, including such challenges as anonymous patent filings in China.
3. **Oversight and Accountability:** Strong oversight is critical for ensuring that the STA meets its objectives. A renewed agreement should include detailed provisions for monitoring cooperative projects and ensuring IP protection. Currently, the U.S. government does not actively fund patent protection in China and other third countries, which leaves American-developed technology vulnerable to infringement for goods manufactured or sold outside the U.S. A comprehensive support oversight mechanism that tracks the flow of innovations, ensures fair IP practices, addresses key differences in regulatory systems, and funds international protection for American-funded inventions is essential.
4. **Security, Support, and Training:** Scientific collaboration has often been managed by scientists rather than skilled technology managers. An STA 2.0 should involve appropriate training and support for all U.S. participants in a joint scientific project, which may include such aspects as: risks assessments for major projects or participants, data and privacy management, clearance procedures for disclosures or patenting, protection of U.S. genetic resources, and support for protection of discoveries through patenting or other protections at home or abroad. Providing adequate training and resources for promoting and managing scientific partnerships will be key to ensuring that cooperation is safe, productive, and sustainable.

CONCLUSION: THE NEED FOR CONTINUED COLLABORATION

The STA has been a critical pillar of U.S.–China relations for more than 45 years. The agreement is more important than ever in ensuring American S&T advancement, addressing global challenges, and better understanding China's evolving innovative capacities. Shutting the door on S&T collaboration with China would not only isolate the U.S., but it would also deprive American researchers of the opportunity to engage with one of the world's most dynamic scientific communities. A carefully managed and transparent STA can help the U.S. stay ahead of global S&T trends while ensuring that the core interests of American researchers and businesses are protected.

In a world where the major challenges of the future — from climate change to global health — require cross-border collaboration and data sharing, the U.S. and China must find ways to work together. Through collaboration, both countries can also improve their own research frameworks. The renewal of the STA, with necessary updates and safeguards, will help both

nations build a framework for productive scientific engagement, ensuring that the benefits of S&T cooperation are shared bilaterally and globally.

A reimagined, more mutually beneficial version of the STA could serve as a beacon for international cooperation, setting a new standard for how global powers collaborate in science and technology for the betterment of all as we move more deeply into the 21st century.

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