

Translation



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The following guide, written by China's Ministry of Science and Technology, lists international S&T cooperation projects that Chinese companies and research institutes can apply for participation in. Participating firms and institutes receive funding from the PRC government. The projects involve a wide range of countries and international organizations and cover a vast array of different technologies.

Title

Application Guide for the 2021 First Batch of Projects for the "Intergovernmental International Cooperation on Science and Technology Innovation" Key Special Project (Draft for Feedback)
“政府间国际科技创新合作”重点专项2021年度第一批项目申报指南（征求意见稿）

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Attachments

Application Guide for the First Batch of Projects in 2021 under the "Intergovernmental International Cooperation on Science and Technology Innovation" Key Special Project

(Draft for Feedback)

The world today is in the midst of great changes not seen in a century. As a new round of scientific and technological revolution and industrial transformation unfolds on a global scale, and at an accelerating pace, the world must not only share the opportunities brought by the deepening globalization of science and technology (S&T), but must also come together to address the challenges of global change, food security, energy and resource shortages, population health, environmental pollution, and a series of other global issues. The Chinese government upholds the concept of mutual benefit and win-win outcomes, and carries out cooperation on S&T innovation with relevant countries, regions, international organizations, and multilateral mechanisms through such means as supporting intergovernmental S&T cooperation projects, carrying out co-funded joint research and development (R&D), promoting exchanges of

S&T personnel and collaborative demonstrations, encouraging participation in large international scientific projects (programs), and encouraging open sharing of large-scale scientific research infrastructure, in order to jointly solve global problems, promote economic and social development, and make due contributions to building a community of common destiny for humanity.

In accordance with the requirements of bilateral (multilateral) intergovernmental arrangements (agreements) on S&T cooperation between China and foreign countries, and the allocation of tasks for implementing the diplomatic commitments of the head of state, the Ministry of Science and Technology (MOST), together with relevant departments, has followed the project formation mechanism of the National Key R&D Program of China to prepare and formulate application guidelines for the first batch of projects in 2021 of the Intergovernmental International Cooperation on Science and Technology Innovation Special Project of the National Key R&D Program.

I. Overall Objectives

In 2021, this Special Project will continue to support various international S&T innovation cooperation and exchange projects carried out under the frameworks of relevant intergovernmental agreements between China and relevant countries, regions, international organizations, and multilateral mechanisms, with project tasks involving S&T and engineering issues of common concern at the intergovernmental S&T cooperation level, as well as issues related to addressing major global challenges through cooperation on S&T innovation. To address the major issues and common challenges of intergovernmental concern, we shall actively strengthen S&T innovation cooperation with major developed and developing countries, and dedicate ourselves to jointly promoting the resolution of relevant issues. Putting S&T innovation exchanges and cooperation foremost, we will promote enhanced capacity building centered around connectivity and other areas of S&T for the people's livelihoods, and promote synergistic development with neighboring countries, and with other developing countries. We will actively participate in intergovernmental international S&T organizations and promote multilateral scientific research and technical cooperation in innovative fields. China's participation in large international scientific projects (programs) will be promoted, and efforts to promote open sharing of large-scale research infrastructure at home and abroad will be accelerated. In view of the requirements of national diplomatic work and the positioning of this Special Project, the Special Project's 2021 guidelines support the bilateral and multilateral intergovernmental S&T cooperation agreements signed in 2020, as well as major diplomatic commitments made recently by China.

II. Research Fields and Directions

As agreed in consultation with relevant partners, for the first batch of projects in 2021, 29 guideline directions will be established to support S&T cooperation with 19 countries, regions, international organizations, and multilateral cooperation mechanisms, with around 266 project tasks, and an estimated total budget of 820 million Chinese yuan Renminbi (RMB) in state funding. The implementation period of

projects will generally be 2-3 years. Specific requirements are as follows.

1.1 U.S.-China Clean Energy Research Center Intergovernmental Cooperation Project

Cooperation agreements: *Protocol for Cooperation on a U.S.-China Clean Energy Research Center* (2009); *Main Consensus and Outcomes of the China-U.S. Leaders' Summit in Beijing* (2014); *List of Results on the Chinese Side from Xi Jinping's State Visit to the United States* (2015); and *Amendment to the Protocol for Cooperation on a U.S.-China Clean Energy Research Center* (2016).

Research fields and directions: Improving the energy efficiency of medium-to-heavy-duty trucks.

Planned number of projects to be supported: one.

Total planned support funds: not to exceed RMB 45 million.

Other requirements: In accordance with the 2014 *Main Consensus and Outcomes of the U.S.-China Leaders' Summit in Beijing*, and the 2015 *List of Outcomes on the Chinese Side from Xi Jinping's State Visit to the United States*, the U.S. and Chinese governments will each invest at least U.S. \$12.5 million to support the development of each research area and direction of the U.S.-China Clean Energy Research Center, and will launch a new area of technical cooperation on improving the energy efficiency of medium-to-heavy-duty trucks. This call for projects is for tasks from 2021 to 2022 in the "improving the energy efficiency of medium-to-heavy-duty trucks" area of the U.S.-China Clean Energy Research Center. Applicants should apply for the second-half stage of funding and work tasks on the basis of tasks from 2018 to 2020.

1.2 China-New Zealand Intergovernmental Science and Technology Cooperation Projects

Cooperation agreement: *China-New Zealand Five-Year Roadmap Arrangement for Science and Technology Cooperation 2018-2022*.

Research fields and directions: Food science, health and biomedicine, and environmental science.

Planned number of projects to be supported: 3.

Total planned support funds: RMB 5 million.

Other requirements: The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

1.3 China-Israel Cooperation Program for Industrial Technology R&D

Cooperation agreement: *Cooperation Agreement between the Government of the People's Republic of China and the Government of the State of Israel on Promoting Industrial Research and Development and Technological Innovation*; *Minutes of the Meeting of the Ministry of Science and Technology of China and the Israel Innovation Authority Concerning Industrial Technology Research and Development Projects for*

2020

Research fields and directions: Unlimited. Joint technology R&D in the fields of vaccines, drugs, public health, and epidemic prevention and control to address the COVID-19 epidemic are encouraged.

Planned number of projects to be supported: Not to exceed 10.

Total planned support funds: RMB 20 million.

Other requirements:

- 1) The lead entity in the application must be an enterprise;
- 2) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

1.4 China-Israel Intergovernmental Joint Research Projects

Cooperation agreements: *Agreement between the Ministry of Science and Technology of China and the Ministry of Science and Technology of Israel Regarding Solicitation of 2020 China-Israel Joint Research Projects; Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Science and Technology of Israel on Deepening Cooperation in Science and Technology.*

Research fields and directions:

1. Medical devices;
2. Research on the adaptation of agriculture to climate change.

Planned number of projects to be supported: Not to exceed 10.

Total planned support funds: RMB 20 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 2) The lead project entity must be a Chinese or Israeli scientific research institution or university—enterprises may only serve as project participants;
- 3) The project implementation cycle is 2 years.

1.5 Projects of the China-Japan Intergovernmental Joint Commission on Science and Technology

Cooperation agreements: *Science and Technology Cooperation Agreement between the Government of the People's Republic of China and the Government of Japan; diplomatic exchange of letters between the Department of International Cooperation of the Ministry of Science and Technology and the Embassy of Japan in China.*

Research fields and directions: New materials, information and communication, and biological science (including biotechnology).

Planned number of projects to be supported: 30.

Total planned support funds: RMB 90 million.

Other requirements:

- 1) Japanese cooperating entities are limited to national, or public universities, or research institutions (i.e., Japanese enterprises are not included);
- 2) Japanese cooperating entities do not need to apply in the pre-application stage. For projects that are to be established, partners must submit the application materials as required by their Japanese authorities once the application defense stage is entered.

1.6 Joint Research Projects between the Ministry of Science and Technology of China and the Japan International Cooperation Agency (JICA)

Cooperation agreements: *Science and Technology Cooperation Agreement between the Government of the People's Republic of China and the Government of Japan; Memorandum of Understanding between the Ministry of Science and Technology of China and the Japan International Cooperation Agency on Joint Research for 2019-2022.*

Research fields and directions: Environment (including energy), medicine.

Planned number of projects to be supported: 10.

Total planned support funds: RMB 50 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 2) Japanese cooperating entities are limited to enterprises registered in Japan.

1.7 Large-Scale Industry-Academia-Research Institute Joint Research Projects between the Governments of China and South Korea

Cooperation agreement: *Minutes of the 14th Meeting of the China-Korea Joint Commission on Science and Technology Cooperation.*

Research fields and directions: Biotechnology, information and communication

Planned number of projects to be supported: two (one in the biotechnology field, one in the information and communication field).

Total planned support funds: RMB 18 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective

countries, unilaterally submitted applications being invalid; the Chinese cooperation team must include participation by at least one enterprise;

- 2) The project implementation cycle is not to exceed 3 years.

1.8 Large-Scale Industry-Academia-Research Institute Joint Research Projects between the Governments of China and South Korea

Cooperation agreement: *Minutes of the 14th Meeting of the China-South Korea Joint Commission on Science and Technology Cooperation.*

Research fields and directions: Biotechnology, information and communication, renewable energy, medicine and medical science, aviation and aerospace, climate change (adaptation).

Planned number of projects to be supported: 6.

Total planned support funds: RMB 6 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;

- 2) The project implementation cycle is not to exceed 3 years.

1.9 Joint Industrial Application Technology Research Projects between the Governments of China and South Korea

- 3) Cooperation agreement: Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Trade, Industry and Energy of the Republic of Korea Regarding Cooperation in Joint R&D Projects on Industrial Application Technology in 2020.

Research fields and directions: Future display technologies, electric and hydrogen vehicles, smart homes, next generation semiconductors, high-tech materials, artificial intelligence (AI), big data, biohealth.

Planned number of projects to be supported: 5.

Total planned support funds: RMB 12.5 million.

Other requirements:

- 1) Project applications by the Chinese and Korean sides must both be enterprise-led.

- 2) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;

- 3) The project implementation cycle is not to exceed 2 years.

2.1 Joint Energy Technology Research Projects between the Governments of China and South Korea

Cooperation agreement: *Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Trade, Industry and Energy of the Republic of Korea Regarding Cooperation on a Joint R&D Project on Energy Technology in 2020.*

Research fields and directions: Clean cogeneration (热点) technologies based on fine particulate matter (particulate matter) management (including carbon capture, utilization and storage membrane separation technology; power generation facility safety and gas safety); renewable energy (including hydrogen and fuel cell technology).

Planned number of projects to be supported: 2.

Total planned support funds: RMB 15 million.

Other requirements:

- 1) The lead project entity must be an enterprise;
- 2) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 3) The project implementation cycle is not to exceed 3 years.

2.2 Joint Research Projects between the Governments of China and Mongolia

Cooperation agreement: *Minutes of the 4th Meeting of the China-Mongolia Joint Commission on Science and Technology Cooperation.*

Research fields and directions: Agriculture and animal husbandry, logistics systems and cross-border e-commerce, water resource environmental protection, comprehensive mineral resource utilization, biotech and pharmaceuticals.

Planned number of projects to be supported: 12.

Total planned support funds: RMB 18 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

2.3 Joint Research Projects between the Governments of China and South Africa

Cooperation agreement: *China-South Africa Agreement on Cooperation in Science and Technology.*

Research fields and directions:

1. Smart manufacturing;
2. Education technology (information and telecommunication technology)

applications in education);

3. Clean energy;
4. Transportation.

Planned number of projects to be supported: 15.

Total planned support funds: RMB 30 million.

Other requirements: The project implementation cycle is not to exceed 2 years; the two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

2.4 Flagship Joint Research Project between the Governments of China and South Africa

Cooperation agreement: *China-South Africa Agreement on Cooperation in Science and Technology.*

Research fields and directions: Traditional medicine.

Planned number of projects to be supported: one.

Total planned support funds: RMB 3 million.

Other requirements: The project implementation cycle is not to exceed 2 years; the two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

2.5 Joint Research Projects between the Governments of China and Egypt

Cooperation agreement: *Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Higher Education and Scientific Research of Egypt on the Establishment of a Joint Funding Program for Scientific and Technological Cooperation.*

Research fields and directions:

1. Renewable energy;
2. Water;
3. Food and agriculture;
4. Sanitation;
5. Information & telecommunications.

Planned number of projects to be supported: 10.

Total planned support funds: RMB 20 million.

Other requirements:

- 1) The two parties cooperating in the project must each submit their

application materials to the project solicitation departments of their respective countries; unilaterally submitted applications will be invalid.

2.6 China-Arab States Joint Laboratories Cooperation Projects

Diplomatic commitment: Implement the key initiative of General Secretary Xi Jinping on "launching a China-Arab States Science and Technology Partnership Program to establish 10 joint laboratories in the fields of modern agriculture, information and communication, population health, etc."

Cooperation agreement: *Memorandum of Understanding between the Ministry of Science and Technology of People's Republic of China and the Office of Artificial Intelligence, Prime Minister's Office, United Arab Emirates (UAE), Regarding Cooperation on Artificial Intelligence Science and Technology.*

Research fields and directions: Modern agriculture, information and communication, population health, AI, advanced manufacturing, energy, transportation, the environment, and other fields.

Planned number of projects to be supported: Not to exceed 10.

Total planned support funds: RMB 60 million.

Other requirements:

- 1) Joint industry-academia-research institution applications are encouraged;
- 2) The project implementation cycle is generally 3 years;
- 3) The cooperating country should be an Arab state (including Algeria, UAE, Oman, Egypt, Palestine, Bahrain, Djibouti, Qatar, Kuwait, Lebanon, Libya, Mauritania, Morocco, Saudi Arabia, Sudan, Somalia, Tunisia, Syria, Yemen, Iraq, Jordan and the Comoros).
- 4) Within 90 days of the publication of this Guide, the applicant shall provide, from the government department of the partner country, an official accreditation document supporting the joint laboratory cooperation (through the partner country's embassy in China to the Ministry of Foreign Affairs; and it must include the name of the partner institution, the name of the joint laboratory, the supportive measures provided by the government department of the partner country for joint laboratory cooperation, and its contact information). To apply for the China-UAE Joint Laboratory in the Field of Artificial Intelligence, it is necessary to obtain an official approval document from the Office of Artificial Intelligence, Prime Minister's Office, United Arab Emirates, or other government department approved by them.
- 5) When applying, complete and submit a Sino-Arab States Joint Laboratory Construction Plan (see appendix for a template), and provide the cooperation agreement on joint laboratory construction signed by the laboratory-supporting units of both sides. The cooperating parties should have a clear agreement or intention agreement on the ownership of future intellectual property rights (IPR) and income from the conversion of S&T

achievements into commercial products (成果转化), which agreement must comply with the relevant provisions of Chinese laws, regulations on the ownership of IPR, and income from achievement conversion. (The IPR agreement or intention agreement, memorandum, letter of certification, or the relevant provisions on IPR in the Sino-foreign cooperation agreement must be attached);

- 6) The foreign cooperating entity should be a research institute, university, or enterprise registered outside China for 3 or more years, have independent legal person status and standardized operation and management, be an institution with relevant advantageous resources in this field and strong S&T R&D capabilities and conditions, and have a long-term and stable basis of cooperation with the Chinese entity applying for the project.

2.7 Joint Research Projects between the Governments of China and Singapore

Cooperation agreements: *Implementation Agreement on Science and Technology Innovation Cooperation between the Ministry of Science and Technology of the People's Republic of China and National Research Foundation Singapore; Guidelines for Supporting Cooperation Projects in 2021 between the Ministry of Science and Technology of the People's Republic of China and National Research Foundation Singapore.*

Research fields and directions: Joint R&D on vaccines, therapies, and testing and diagnostic technologies to address infectious diseases (including COVID-19).

Planned number of projects to be supported: Not to exceed 4.

Total planned support funds: RMB 10 million.

Other requirements: The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid; project execution period not to exceed 3 years.

2.8 Research and Innovation Cooperation Projects Based on the EU-China Co-Funding Mechanism for Research and Innovation Cooperation

Cooperation agreement: *Agreement between the Ministry of Science and Technology of China, and the Directorate-General for Research and Innovation of the European Commission on Implementation of the 2018-2020 China-EU Flagship Cooperation Programme on Research and Innovation, and Other Types of Research, and Innovation Cooperation Projects Based on the Co-Funding Mechanism.*

Research fields and directions:

1. Agriculture, food, and biotechnology.
2. Environment (including but not limited to sustainable urbanization, climate change, etc.).

3. Transportation.
4. Aviation.
5. New generation information networks: 5G telecommunication technology, optical communication, processor (CPU) technology, internet of things (IoT) technology, quantum computing, big data technology.
6. Smart and green manufacturing: high-end computer numerical control (CNC) machines and intelligent robots, electric power equipment, next-generation semiconductors, additive manufacturing, new energy equipment, micro and nano manufacturing, gas turbines.
7. Safe, clean and efficient modern energy: clean coal utilization technology, offshore wind power technology, smart grid technology, hydrogen fuel cell technology, nuclear power utilization and nuclear decommissioning technology.
8. Advanced, effective, safe, and convenient health technologies: biopharmaceuticals, precision medicine, high-performance medical devices, control of major infectious diseases, antibiotic resistance, regenerative medicine, medical big data, medical robotics, elder care service technology, traditional Chinese medicine (TCM).
9. Marine equipment: marine engineering equipment and high-tech ships, deep-sea oil and gas, natural gas hydrates, deep-sea operations.
10. Aerospace: aerospace equipment, space science technology, satellite application technology (small satellite and payload technology), remote sensing technology (deep space exploration, satellite imaging, atmospheric exploration, lunar-based observation).
11. New materials: graphene technology, nanomaterials, high-performance structures and composites, advanced semiconductor materials, advanced light alloy materials, advanced functional and smart materials, catalytic materials.
12. Scientific research on large scientific installations.
13. Public safety: disaster warning and handling, food and drug safety testing.

Planned number of projects to be supported: 30.

Total planned support funds: RMB 90 million.

Other requirements:

- 1) The EU-China Co-Funding Mechanism for Research and Innovation Cooperation is aimed at supporting Chinese participation within priority areas of the EU's Horizon 2020 program.
- 2) Project applicants must apply together with their European partners for projects in the 2018, 2019, and 2020 guidelines issued for the EU's Horizon 2020 program; projects for other years are not included under this

solicitation;

- 3) Individual Horizon 2020 projects only support project applications from individual Chinese parties. Where multiple Chinese parties are to participate in the same Horizon 2020 project, a single entity must be determined through consultation to be the lead for submitting a single application. The Chinese applicant must be a formal partner (participant) of the Horizon 2020 program, i.e., included in the list of Horizon 2020 "participants;"
- 4) The Chinese and European parties should carry out mutually complementary and mutually beneficial cooperation on research and innovation.
- 5) The Chinese entity must submit an English version of its application for participation in the Horizon 2020 program, as well as a Chinese translation of the project budget and the research content for the Chinese entity's participation. It must ensure (a) that the budget of the Chinese entity is included in the overall budget of the Horizon 2020 program, (b) that the budget of the Chinese entity in the project application submitted by the Chinese entity to MOST does not exceed the budget of the Chinese entity in the Horizon 2020 program, and (c) that the research content includes the research content of the Chinese entity's participation in the English application.
- 6) Project execution period is generally 2 to 3 years;
- 7) For project arrangements on the European side, please search for the specific area of research in the 2018-2020 work program:
<https://ec.europa.eu/programmes/horizon2020/en/what-work-programme;>

EU-China General Co-Funding Mechanism for Research and Innovation Cooperation: http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020_localsupp_China_en.pdf;

FAQ on the EU-China General Co-Funding Mechanism for Research and Innovation Cooperation: https://eeas.europa.eu/sites/eeas/files/questions_answers_on_eu-china_co-funding_mechanism_for_research_and_innovation_cooperation_0.pdf;

European side contact email: Delegation-China-Scitech@eeas.europa.eu

2.9 China-Spain Intergovernmental Science and Technology Cooperation Projects

Cooperation agreements: *Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Science and Innovation of the Kingdom of Spain Regarding Science and Technology Cooperation in the Field of Advanced Materials*; *Memorandum of Understanding between the Ministry of Science and Technology of China and the Ministry of Science and Innovation of the Kingdom of Spain Regarding Science and Technology Cooperation in Key Fields*; and *Administrative*

Guidelines for the Joint Solicitation of Cooperation Projects (CHINEKA Program) from the Department of International Cooperation of the Ministry of Science and Technology of China and the Center for the Development of Industrial Technology of Spain.

Research fields and directions:

1. Smart cities;
2. Production technology, including smart manufacturing;
3. Biotech and pharmaceuticals, and health technology, including medical devices, biotechnology applications, or pharmaceutical technologies that can address global epidemics;
4. Clean technology, including environmental, renewable energy, and water treatment-related technologies;
5. Modern agriculture, including fishery technology, food processing, and food safety;
6. Advanced materials.

Planned number of projects to be supported: Not to exceed 15.

Total planned support funds: not to exceed RMB 45 million.

Other requirements:

- 1) Project execution period is in principle 2 to 3 years;
- 2) Both sides support industry-driven and market-oriented joint R&D, and technology cooperation projects, and encourage the combination of industry, academia and research institutes; Spanish applicants or participating entities must include at least one enterprise, and Spanish enterprises must provide matching contributions in accordance with the relevant requirements of the Center for the Development of Industrial Technology of Spain.
- 3) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 4) In addition to following the requirements of this notice, a Chinese applicant must also cooperate with the Spanish applicant in completing the English project application form, which will be submitted by the Spanish applicant to the Center for the Development of Industrial Technology of Spain, the link for which is <https://sede.cdti.gob.es/>;
- 5) When the two cooperating entities submit their applications, an agreement on IPR or a cooperation document that includes specific provisions on IPR must be submitted at the same time.

2.10 China-Cyprus S&T Innovation Cooperation Projects

Cooperation agreement: *Agreement between the Governments of the People's*

Republic of China and the Republic of Cyprus on Science and Technology Cooperation (2015).

Research fields and directions:

- 1.Environment;
2. Health;
3. Agriculture.

Planned number of projects to be supported: 5.

Total planned support funds: RMB 8 million.

Other requirements:

- 1) The projects in this solicitation are aimed at promoting S&T innovation cooperation between China and Cyprus. The two parties cooperating in a project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.
- 2) The Chinese and Cypriot cooperating entities should sign an agreement or a letter of intent, which must include provisions related to IPR. The participating entities of the two sides should clarify their contributions and the division of labor in the joint R&D, and commit to abiding by the relevant laws and regulations of China and Cyprus when carrying out data collection, storage and processing, and other cooperative activities.
- 3) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 4) The project execution period is in principle not to exceed 2 years.

3.1 China-Belgium-South Africa Intergovernmental Science and Technology Cooperation Projects

Cooperation agreement: *China-Belgium-South Africa Agreement on Joint Solicitation of Tripartite Scientific Research Cooperation Projects.*

Research fields and directions: Biodiversity, interaction between climate change and health. Planned number of projects to be supported: 4.

Total planned support funds: RMB 5 million.

Other requirements:

- 1) The project execution period is in principle not to exceed 3 years.
- 2) Each project must be applied for by at least one cooperating entity each from China, Belgium, and South Africa, and the three partners must submit their applications to the institutions designated by their respective national science and technology departments;
- 3) The fields of research must include at least two of the following:

biodiversity, climate change, and health.

3.2 China-Belgium (Wallonia) Intergovernmental Science and Technology Cooperation Projects

Cooperation agreement: *Memorandum of Understanding on Research and Innovation between the Department of International Cooperation of the Ministry of Science and Technology of China and Wallonia-Brussels International.*

Research fields and directions:

1. Biotechnology (focused on supporting scientific cooperation in fields related to the fight against the COVID-19 epidemic);
2. Information and communication technology and microelectronics;
3. Aviation and aerospace;
4. Materials science and nanotechnology;
5. Agricultural science.

Planned number of projects to be supported: 10.

Total planned support funds: RMB 10 million.

Other requirements:

- 1) The project execution period is in principle not to exceed 3 years;
- 2) The Chinese and Belgian cooperating entities must sign clear cooperation documents on IPR, etc.;
- 3) The two parties cooperating in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 4) If there are enterprises participating, the participating enterprises must provide matching contributions at least equal to the amounts of government funding they receive.

3.3 Joint Research Projects between the Governments of China and Austria

Cooperation agreement: *Minutes of the 12th Meeting of the China-Austria Joint Commission on Science and Technology Cooperation.*

Research fields and directions:

1. Medicine and health research (including TCM) (focused on supporting scientific cooperation in fields related to fighting the COVID-19 epidemic);
2. Quantum information science;
3. Information and communication technology;
4. Smart manufacturing technology;
5. Renewable energy and low-carbon technology;

6. Food, agriculture, and biotechnology;
7. The environment, smart cities, and sustainable urbanization.

Planned number of projects to be supported: 15 (up to 7 of which shall be projects related to fighting the COVID-19 epidemic).

Total planned support funds: RMB 30 million.

Other requirements:

- 1) The input levels of cooperating entities on the Chinese and Austrian sides should be basically in balance;
- 2) The Chinese and Austrian cooperating entities must sign a clear IPR agreement;
- 3) The project execution period is in principle not to exceed 2 years;
- 4) If there are enterprises participating, the participating enterprises must provide matching contributions at least equal to the amounts of government funding they receive.
- 5) Participation by youth and female researchers is encouraged.

3.4 China-Finland Intergovernmental Science and Technology Cooperation Projects

Cooperation agreements: *Memorandum of Understanding for China-Finland Science and Technology Innovation Cooperation between the Department of International Cooperation of the Ministry of Science and Technology of the People's Republic of China, and the Finnish Funding Agency for Technology and Innovation; Strategic Flagship Initiative for Sino-Finnish Science, Technology, and Innovation Cooperation 2019-2023*. Research fields and directions:

(i) Energy domain

Includes but is not limited to:

1. Smart grid

- (1) Flexible power systems, including power generation and energy storage, for increasing the proportion of grid-connected renewable energy generation in the power system;
- (2) Power-to-X technology and energy storage for distributed generation;
- (3) Co-generation technology;
- (4) Advanced, complex district heating and cooling (DHC) networks (including sources such as wastewater, other water resources, data center waste heat, and renewable energy) and technologies to optimize the production, storage, and distribution of energy for providing heating and cooling in cities (residential, commercial, and office areas);
- (5) Digitalization of the energy sector to help in optimizing energy systems and improving

energy system flexibility, and pursuit of national-level support policies.

2. Clean energy production technology

(1) Innovation in the paper and pulp industry, the steel industry, and the food industry, including poultry production, in order to expand utilization of wastewater and renewable energy sources, and increase energy efficiency;

(2) More environmentally friendly thermal power plants: use of multi-fuel-fired boilers, reduction of emissions, flue gas (烟气) cleaning and utilization, and raising process efficiency.

3. High-efficiency resource and energy production processes

(1) Energy conversion and valued-added utilization of waste (using waste to produce fuels, generate power, etc.), especially the use of waste to prepare liquid fuels (methanol, ethanol, etc.);

(2) Sustainably improving the utilization of energy, water, and other resources, environmental impact minimization, e.g., DHC network digitalization.

(ii) Health field, which includes but is not limited to:

1. Data and analysis: Application of AI in prediction, diagnosis, and algorithm development, use of data (e.g., data on coronavirus, cancer) to solve problems.

2. Epidemiological and pandemic-related research: For example, how to use population movement information to predict the spread and development of viruses, and the mechanisms of molecular immune response from environmental exposure in childhood allergy-related diseases.

3. Life sciences field: Genomics, precision medicine, drug development, disease treatment, etc.

(iii) Smart mobility

Includes but is not limited to:

1. Mobility as a service (MaaS): Exploration of multi-party service solutions (interfaces, APIs, and apps); research on solution integration platforms; commercialization of MaaS concepts, etc.

2. Smart city transportation solutions: Research on large-scale, real-time, intelligent and highly reliable traffic monitoring optimization technology; research on roadside connection technology; development of smart gateways for use in smart city systems integration, etc.

3. Smart city transportation system integration: Systematic analysis of smart city transportation needs and development opportunities; simulation methods for enhanced urban transportation solutions that take into account people's mobility needs; application of MaaS and smart city transportation solutions, etc.

(iv) Sustainable manufacturing field, which includes but is not limited to:

1. Research on process optimization methods and production technologies for sustainable manufacturing.
2. Research on energy efficiency measurement and assessment methods for sustainable manufacturing.
3. Research on energy efficiency information management systems for sustainable manufacturing, improving energy management, and control throughout the manufacturing process.
4. Development of new service-oriented business models, and building sustainable manufacturing ecosystems based on product life cycles.

Planned funding and number of projects supported:

In the energy field, planned support not to exceed 5 projects, and total funding not to exceed RMB 24 million; in the health, smart mobility, and sustainable manufacturing fields, total planned support not to exceed 10 projects, and total funding not to exceed RMB 30 million.

Other requirements:

- 1) Project participants must include at least one Chinese entity and one Finnish entity (Finnish side is required to be enterprise-led), and they must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid;
- 2) Industry-academia-research institute collaboration and joint applications by multiple enterprises are encouraged;
- 3) For projects on the Chinese side, the participating enterprises must provide matching contributions at least equal to the amounts of government funding they receive (see the Finnish guidelines for relevant requirements on the Finnish side);
- 4) The Chinese and Finnish partners must complement each other's strengths and benefit each other equally, and the input levels of the project parties should be basically in balance;
- 5) The Chinese and Finnish partners must specify the responsibilities and division of labor of the participating parties in the cooperation, and they must sign a clear IPR agreement;
- 6) The project execution period is in principle not to exceed 3 years. Collaboration and exchanges among personnel in projects on both sides are encouraged.

3.5 Sino-German Intergovernmental Smart Manufacturing (Industry 4.0) Science and Technology Cooperation Projects

Cooperation agreements: *Joint Declaration of Intent between the Ministry of Science and Technology of the People's Republic of China and the Federal Ministry of Education and Research of the Federal Republic of Germany on the Development and*

Promotion of Innovative Solutions in the Field of Smart Manufacturing (Industry 4.0) and Smart Services through Bilateral Science and Technology Cooperation; Joint Declaration of Intent between the Ministry of Science and Technology of the People's Republic of China and the Federal Ministry of Education and Research of the Federal Republic of Germany on Cooperation in "Smart Manufacturing Science and Technology" Innovation.

Research fields and directions:

1. Smart product service and support systems oriented toward smart manufacturing (Industry 4.0)

—Development of new product lifecycle management solutions oriented toward smart product service and support systems, such as support for cross-border data interaction, management standards, and business;

—Development of new smart quality management and control technology based on big data analysis, AI, etc.;

—Development of dynamic test bed environments for use in testing AI integration and human-computer collaboration.

2. Research on multinational interoperability rules oriented toward networked collaborative manufacturing

—Semantic model-based administrative shell systems that realize support for multinational applications;

—Research on requirements and rules for trusted collaboration value networks for use in new business models;

—Research on rules and mechanisms for industrial data interaction based on user-driven collaborative networks;

—Development of cloud-edge optimization solutions based on the application of AI for smart cloud manufacturing, by defining use cases for scenario-driven service platforms.

3. Energy and resource efficiency improvement for sustainable manufacturing development

—Development of specific methods and tools for comprehensive accounting, improvement, and evaluation of the energy and resource efficiency of production processes, and production process flow chains;

—Development of applicable energy information management systems for use in achieving highly energy-efficient and resource-efficient manufacturing processes;

—Development of new service-oriented business models that provide services related to remanufacturing, refurbishment, and recycling to further improve product life cycle sustainability, based on product life cycle data management.

Planned number of projects to be supported: 4.

Total planned support funds: RMB 32 million.

Other requirements:

- 1) Small- and medium-size enterprises are encouraged to apply;
- 2) In order to encourage industry-academia-research institute integration, Sino-German cooperation projects should adopt the "2+2" cooperation model, that is, there should be at least one research institute and one enterprise from each of the two sides, and in principle, the enterprises should provide at least the same amount of matching funds as the government funding. Where feasible and meaningful, enterprises are encouraged to participate in relevant standardization activities from an early stage.
- 3) Both the Chinese and German cooperating entities must sign a project cooperation document such as an agreement or letter of intent specifying the division of labor to be contributed in the collaborative research and the distribution of IPR.
- 4) To promote the extension of industry applications, the formation of standards from research results is encouraged.

3.6 Sino-German Intergovernmental Science and Technology Cooperation Projects in the Field of Electric Vehicles

Cooperation agreement: *Joint Declaration of Intent between the Ministry of Science and Technology of the People's Republic of China and the Federal Ministry of Transport and Digital Infrastructure of the Federal Republic of Germany on Continuing Cooperation in the Field of Innovation-Driven Technology and Related Infrastructure.*

Research fields and directions:

1. Operational data-based research on the safety and economy of pure electric vehicles and key components, including: pure electric vehicle operational safety, testing, and evaluation technology and methods.
2. Research on development strategies and standards for electric (pure electric and hydrogen fuel cell) vehicles in large-scale applications, including: vehicle technical route selection, and vehicle operations and maintenance (O&M), as well as data-driven charging/hydrogen refueling infrastructure planning and related technologies, and renewable energy and hydrogen energy for electric vehicles.
3. Research on fuel cell vehicles and hydrogen refueling station construction, including: research on high-efficiency, and low-cost drive systems, and hydrogen refueling systems, research on the environmental impact of fuel cells and vehicle parts, research on testing and evaluation technology, standardization, hydrogen refueling station construction and the approval process, and related specifications, renewable energy hydrogen production, etc.

Planned number of projects to be supported: 5-8.

Total planned support funds: RMB 25 million.

Other requirements:

- 1) In order to encourage industry-academia-research institute integration, Sino-German cooperation projects adopt the "2+2" cooperation model, that is, there should be at least one research institute and one enterprise from each of the two sides, and in principle, the enterprises should provide at least the same amount of matching funds as the government funding;
- 2) Both the Chinese and German cooperating entities must have a signed project cooperation document such as an agreement or letter of intent, within its validity period, specifying the division of labor to be contributed in the collaborative research and the distribution of IPR.
- 3) The project implementation period is limited to 2-3 years.

3.7 Sino-German Intergovernmental Science and Technology Cooperation Projects in the Field of Antibiotic Resistance

Cooperation agreement: *Intergovernmental Agreement between the Federal Republic of Germany and the People's Republic of China on Scientific and Technological Cooperation.*

Research fields and directions: Projects should focus on the generation, transmission, control, and reduction of antibiotic resistance. The two fields of research that are planned to be supported are as follows.

1. Innovative research on antibiotic resistance in environmental hosts (water, soil, animals, plants, biofilms on plastic waste, etc.).

- (1) With regard to the generation, transmission, and spread of antibiotic resistance, the biological and epidemiological relevance (risk assessment) of environmental hosts to humans or animals.
- (2) The impact on antibiotic resistance of antibiotics, antibiotic residues, and other contaminants associated with human and animal health measures.
- (3) Improved or new methods to quantify and characterize drug-resistant bacteria, genes and mobile genetic elements, and antibiotics and antibiotic residues in environmental samples such as wastewater, soil, and air.
- (4) Innovative interventions to reduce antibiotic resistance in environmental hosts.
 2. Innovative research on drug-resistant bacteria in the human body, livestock, pets, and food.
 - (1) Innovative methods to prevent or reduce drug-resistant bacteria.
 - (2) Development of smart surveillance and intervention strategies to prevent the transmission of multidrug-resistant bacteria between animals, food, and people, as well as further transmission in hospitals (antibiotic resistance surveillance), and

implementation of antimicrobial drug management.

- (3) Impact of bactericidal and bacteriostatic agents (products) on the generation of drug-resistant bacteria.
- (4) Comparison of the incidence of major bacterial infections, the distribution of major pathogenic bacteria and rates of drug resistance among the elderly in China and Germany, and analysis of the causes of formation, in order to provide a basis for formulating intervention strategies.
- (5) Analysis of the correlation between clinical drug-resistant bacteria generation and antimicrobial drug use, with proposed preventive and control measures for drug-resistant bacteria.

Planned number of projects to be supported: 4.

Total planned support funds: RMB 16 million.

Other requirements:

- 1) Clinical trial projects should make use of existing biobanks and/or existing study cohorts, and not newly enroll patients.
- 2) Both Chinese and German cooperating entities must have a signed project cooperation document such as an agreement or letter of intent, within its validity period, specifying the division of labor to be contributed in the collaborative research and the distribution of IPR.
- 3) Project implementation is not to exceed 3 years.

3.8 Sino-German joint research projects to address the COVID-19 epidemic

Cooperation agreement: *Joint Declaration by the Ministry of Science and Technology of the People's Republic of China and the Federal Ministry of Education and Research of the Federal Republic of Germany on a Sino-German Innovation Platform for Life Sciences.*

Research fields and directions:

1. Strengthening surveillance of the novel coronavirus (SARS-CoV-2), and promoting optimization and improvement of methods and processes for the prevention and control of SARS-CoV-2 infection;
2. Formulation of recommendations or guidelines for emergency and long-term treatment of COVID-19 to improve treatment;
3. Development of transferable technologies for COVID-19 prevention, diagnosis, and treatment;
4. Research on healthcare system response, and provision of key medical technologies and tools;
5. Optimization SARS-CoV-2 (COVID-19) treatment protocols;
6. Assessment of risk factors and protective factors that affect infection;

7. Research on the identification of, and prevention and control strategies for, SARS-CoV2 (COVID-19) and emerging infectious diseases.

Planned number of projects to be supported: 6.

Total planned support funds: RMB 18 million.

Other requirements:

- 1) Host country laws and regulations must be followed in carrying out project research;
- 2) Joint application by multiple teams is encouraged;
- 3) Both Chinese and foreign cooperating entities must sign a project cooperation document such as an agreement or letter of intent, which must include relevant provisions on IPR, and the cooperating entities of the two sides must specify the division of labor to be contributed in the collaborative research.
- 4) The project implementation cycle is not to exceed 3 years;
- 5) Preclinical and clinical research-related R&D will not be supported.

3.9 Joint R&D Projects between the Governments of China and Hungary

Cooperation agreements: *Agreement between the Government of the Republic of Hungary and the Government of the People's Republic of China on Science and Technology Cooperation (2002); Memorandum of Understanding between the Ministry of Science and Technology of the People's Republic of China and the National Research Development and Innovation Office of Hungary on Co-Funding Hungarian-Chinese Research Cooperation Projects (2017).*

Research fields and directions:

1. Public health (including infectious diseases);
2. Neuroscience;
3. AI;
4. Physics.

Planned number of projects to be supported: Not to exceed 4.

Total planned support funds: RMB 6 million.

Other requirements:

- 1) The project execution period is 2021-2023, and in principle is not to exceed 3 years;
- 2) Enterprises are encouraged to participate in joint R&D projects;
- 3) The cooperating parties in the project must each submit their application materials to the project solicitation departments of their respective countries, unilaterally submitted applications being invalid.

3.10 Group on Earth Observations (GEO) Cooperation Projects

Cooperation agreements: *Memorandum of Understanding between the Ministry of Science and Technology of the People's Republic of China and the Group on Earth Observations; Group on Earth Observations Ten-Year Strategic Plan (2016-2025)* (abbreviated as the GEO Ten-Year Strategic Plan), and the *Ten-Year Implementation Plan for China's Global-Oriented Integrated Earth Observation System of Systems (2016-2025)* (abbreviated as the China GEO Ten-Year Implementation Plan).

Research fields and directions:

(i) Global observation data services

1. Research content of Chinese remote sensing data services system R&D and capacity building oriented toward southern Africa: Develop a Chinese satellite remote sensing data reception service system covering southern Africa, and directed at the ecological environment monitoring and sustainable development needs of southern African countries, and carry out regional capacity building in conjunction with demonstrations of typical applications.

Evaluation indicators: Establish a remote sensing data reception service system, develop the data cloud services capacity of several Chinese satellites including the China-Brazil Earth Resources Satellite 04A (CBERS-04A), with annual data service volume of not less than 10,000 images (景), and have no less than two user training-promotion events and at least two demonstration applications.

2. Global ten-meter domestic satellite data, and common products and services for typical land surface elements, and their promotion and application.

Research content: Develop domestic ten-meter spatial resolution global coverage data and a set of common products for typical land surface elements, promote the application of data and products in connection with GEO program projects, and expand the international influence and scientific support of datasets.

Evaluation indicators: Update the global 10-meter domestic high resolution satellite dataset once a year, with three continuous updates; in phase one of the common product set for typical global land surface elements, coverage will be not less than 95%, with five or more land surface elements; promote dataset application in no less than five GEO program projects.

3. Meter-level high-resolution domestic remote sensing satellite image cloud services and their promotion and application

Research content: Develop meter-level high-resolution domestic remote sensing satellite datasets covering the "Belt and Road"¹ region, launch efficient cloud services and instant sharing for GEO users in the countries along the route, and carry out application promotion linked with GEO projects.

Evaluation indicators: Develop a set of meter-level domestic satellite data

¹ Translator's note: Translator's note: The "Belt and Road" ("一带一路") refers to the Silk Road Economic Belt (丝绸之路经济带) and the 21st Century Maritime Silk Road (21世纪海上丝绸之路).

products for the "Belt and Road" region, and a set of efficient cloud service platforms for instant sharing, and carry out no less than five international application demonstrations.

4. International application promotion of the one-stop remote sensing big data online analysis platform.

Research content: Based on operations-oriented domestic commercial cloud platforms for remote sensing big data analysis, and in accordance with the principles of GEO data sharing and knowledge service, develop a GEO-specific environment for a remote sensing online cloud analysis platform with in-memory processing, and link to the execution of promotion and related tasks of the GEO secretariat for global remote sensing cloud platforms.

Evaluation indicators: Develop a GEO-specific environment for a one-stop remote sensing big data online analysis platform, provide computing power and data resources to support large-scale remote sensing online analysis, and participate in no less than 50 GEO jointly promoted applications. Leadership by enterprises is encouraged for these projects.

(ii) Asia-Oceania regional integrated Earth observation

5. Development of an Earth observation data hub and typical application toolset for the Asia-Oceania region

Research content: Conduct research on the generation of Asia-Oceania region analysis ready data (ARD), based on domestic satellite data resources, and methods for constructing typical application tools; and develop application tools and product sets based on data hubs in typical fields. Build an Asia-Oceania Regional Earth Observation Data Hub (AO Data HUB), which can be connected to the Global Earth Observation System of Systems (GEOSS) infrastructure and national integrated Earth observation data sharing platforms.

Evaluation indicators: A set of software for the AO Data HUB platform, which can link to the global GEOSS infrastructure and national integrated Earth observation data sharing platforms, at least three sets of ARD processing software tools, and five or more types of full-process application analysis tools generated by typical application products and regional application demonstration datasets.

6. Monitoring and capacity building in Pacific Island countries for typical elements of marine and coastal zone ecosystems

Research content: Based on domestic high-resolution satellite data, conduct research on marine and shoreline ecological environment monitoring methods in Pacific Island countries; develop three-dimensional cooperative remote sensing-based monitoring technology for underwater geomorphology and benthic ecosystems of islands and reefs; analyze the impact of surface coverage changes, island and reef changes, and near-shore ecology, and carry out application demonstrations and capacity building.

Evaluation indicators: A set of remote sensing information product datasets,

covering eight or more Pacific Island countries, for monitoring substrates and geomorphology, surface cover, marine and shoreline ecological environment elements of typical islands and reefs, a set of monitoring and analysis service software, and no less than one capacity training.

7. Remote sensing assessment and capacity building for sustainable development in the Hindu Kush-Himalayan Region

Research content: Conduct research on customization, calibration, and validation methods for dedicated remote sensing inversion models of key elements in the Hindu Kush-Himalayan region, such as agricultural conditions, water resources, and the ecological environment; construct a sustainable development assessment methodology and cloud service system adapted to mountainous regions; carry out joint monitoring and assessment of remote sensing in the Hindu Kush-Himalayan region; publish sustainable development assessment reports; and carry out capacity training.

Evaluation indicators: One national-scale sustainable development assessment system for the Hindu Kush-Himalayan region, and one remote sensing inversion product dataset of key elements such as agricultural conditions, water resources, ecological environment, etc.; publish regional sustainable development remote sensing assessment reports, and carry out training twice.

(iii) Benchmarking of key tasks in the GEO Ten-Year Strategic Plan

8. Research and development of a national level global Earth observation system of systems (GEOSS) framework and prototype system

Research content: Based on the GEO Ten-Year Strategic Plan and three-level "global-regional-national" GEOSS technology system, conduct research on GEOSS core technologies based on data and knowledge fusion, build a national GEOSS top-level technology framework, develop a prototype system linked to the global and regional GEOSS infrastructure, and carry out demonstration and verification of multi-system collaboration on data, knowledge, and applications.

Evaluation indicators: Complete the construction of a national-level GEOSS top-level technology framework, establish knowledge systems and knowledge bases in three priority areas of GEO, develop a national-level GEOSS prototype system with at least five types of knowledge, such as data, tools, literature, and applications, managed by and associated with the system, and which can be linked with the global GEOSS infrastructure and national integrated Earth observation data sharing platform, and carry out demonstration of applications.

9. Sino-Europe cooperation on Earth observation forest monitoring technology and demonstration of applications

Research content: Fully utilizing China-EU satellite data resources, make breakthroughs in key technologies for China-EU satellite joint computation (解算) and fusion, study regional forest type identification and vertical structure information extraction methods, establish a collaborative forest resource monitoring system with multi-source observation data, and carry out regional-scale demonstration of

applications.

Evaluation indicators: For GEO's Global Forest Observation Initiative (GFOI), contribute ≥ 3 new technologies or new methods related to Sino-European satellite integrated processing, remote sensing-based dynamic monitoring of forest resources, and forest biomass estimation; develop a forest resource monitoring system; submit forest resource monitoring product datasets for three demonstration areas greater than 500km², with spatial resolution better than 20 meters.

10. Observation and assessment of global terrestrial ecosystem carbon disturbance (碳扰动)

Research content: Build an international collaboration network for monitoring global terrestrial ecosystem carbon disturbance, research and develop remote sensing products for long time series (2000 to 2020) natural and anthropogenic carbon disturbance, carry out carbon loss/gain assessment of natural and anthropogenic disturbance of terrestrial ecosystems, and publish monitoring and assessment reports.

Evaluation indicators: Spatio-temporally consistent datasets of key elements of the carbon cycle, datasets of high-resolution land cover type change products, datasets of global terrestrial ecosystem carbon disturbance products, with a time range of 2000-2020; publish Chinese and English versions of global terrestrial ecosystem carbon disturbance monitoring and assessment reports.

11. Research on methods for global remote sensing-based inventorying of greenhouse gases

Research content: Research and develop methods for processing and analysis of global- and regional-scale multi-source satellite cooperative observation data on key parameters of atmospheric greenhouse gases, atmospheric pollutants, and vegetation based on cooperative observation by Chinese and international satellites; complete a scientific framework for inventorying, carry out scientific estimation of anthropogenic greenhouse gas emissions and related key climate change indicators, and quantitative assessment of the impact of emission reduction measures on climate change.

Evaluation indicators: Data products, with independent (自主) IPR, of global and Chinese regional anthropogenic greenhouse gas (CO₂ and CH₄) emission fluxes with spatial resolution better than 5° globally and 0.4° in China, and demonstration of climate change inventory applications for at least two types of typical emission reduction measures to assess their impact on greenhouse gas balance and climate change.

(iv) Research on the comprehensive application of Earth observation

12. Research on the sustainable development of urban residential environments

Research content: Make breakthroughs in key technologies such as multi-satellite joint modeling of urban environmental elements and hierarchical simulation solutions, develop time series remote sensing products of key elements such as the structure and types of global urban cover, atmospheric quality, and water and heat environments; research quantitative assessment models of urban environmental quality and

ecological livability, and ecological efficiency and sustainability; develop an urban residential environment monitoring system with multi-source observation data cooperation, and select typical global cities for comprehensive assessment and demonstration of applications.

Evaluation indicators: Urban environmental change and ecological livability assessment of ≥ 5 globally selected typical cases; one application software system for assessment of urban environmental quality and ecological livability and efficiency, etc.; collections (≥ 5) of global urban time series remote sensing products on key ecological elements; two or more international trainings.

13. GEOSS application assessment and strategic analysis

Research content: Track and analyze GEO-related work and scientific research dynamics, study comprehensive evaluation index systems and assessment models for GEO applications, conduct dynamic monitoring and evaluation of the China GEO Ten-Year Implementation Plan, and participate in and support comprehensive assessment of the GEO Ten-Year Strategic Plan's implementation.

Evaluation indicators: Build an evaluation indicator system and assessment model, develop an GEO application assessment information system, submit no less than five GEO system assessment reports, regularly publish quarterly reports on GEO work information dynamics and strategic analysis reports, conduct at least one annual assessment of the China GEO Ten-Year Implementation Plan, and participate in and support work on the comprehensive assessment of the GEO Ten-Year Strategic Plan's implementation.

14. High-mountain Asia and Arctic snow-glacier and geological hazard monitoring technology, and demonstration of applications

Research content: Make breakthroughs in multi-source, active and passive, optical and microwave, multi-level ground and space observation-based cooperative and integrated processing technologies; study high-frequency monitoring of snow and glaciers, glacier storage estimation, and cold area geological hazard identification and risk analysis methods; establish a multivariate spatial monitoring and analysis system for snow, glaciers, and other elements, and an integrated remote sensing-based monitoring and analysis system for cold area geological hazards; and carry out demonstrations of typical applications in the high-mountain Asia and Arctic regions.

Evaluation indicators: ≥ 4 new monitoring methods and technologies, one high-mountain Asia and Arctic region snow-glacier and geological hazard monitoring system; time limit for updating key monitoring elements ≤ 10 days, ≥ 4 multivariate ground and space observation integrated datasets; carry out demonstrations of typical applications and international promotion.

15. Global remote sensing-based monitoring and forecasting of crop pests and diseases

Research content: Make breakthroughs in key technology for coupling remote sensing and pest and disease mechanism models, study the methods of dynamic

extraction and time sequence monitoring of pests and diseases in different regions of the world, build a remote sensing-based monitoring and forecasting system for crop diseases and pests, and cooperate in the demonstration of applications in the main food-producing regions of the world.

Evaluation indicators: Research new technologies and new methods (≥ 5) for coupling remote sensing of pests and diseases with pest mechanism model measurement and reporting; develop a crop remote sensing-based monitoring and forecasting system for major pests and diseases, with a spatial resolution better than 10 m, and carry out localized operation and application of the system in three or more countries; for five or more food-producing countries in the world, publish crop pest and disease dynamic monitoring and forecasting thematic maps and analysis reports (≥ 20); international training of ≥ 2000 people.

Planned number of projects to be supported: 15.

Total planned support funds: RMB 60 million.

Other requirements:

- 1) The contents listed in these guidelines are intended to support China's participation in GEO work program projects and related activities; under the above 4 research areas (i) to (iv), 15 sub-directions and their corresponding research contents and evaluation indicators are detailed, from which each project shall select one sub-direction (e.g., 1.) for research. The research contents of a project must cover all the research contents of the sub-direction and achieve the corresponding evaluation indicators.
- 2) Priority is given to supporting Chinese teams included in GEO's work plan for 2020-2022 (http://www.earthobservations.org/gwp2020_dev.php);
- 3) Project applicants must abide by the relevant rules, objectives and requirements of GEO;
- 4) The project applicant's international cooperation team must be from a GEO member country or participating organization;
- 5) Enterprise applicants must provide matching contributions at least equal to the amounts of government funding they receive.
- 6) A project output dataset shall be remitted to the China GEOSS Data Sharing Network (GEOSS-DSNet);
- 7) Project progress and achievements must be submitted to the GEO China Secretariat to support the Chinese delegation's participation in GEO results exhibitions, executive committees, plenums, etc.;
- 8) The project implementation cycle is in principle not to exceed 3 years;
- 9) Information on the Group on Earth Observations: <http://www.earthobservations.org/>.