ISTC
INTERNATIONAL SCIENCE
AND TECHNOLOGY CENTER

Annual Report 2023

International Science and Technology Center

2023

0 ABOUT US
1 STATEMENT OF THE CHAIRMAN OF THE ISTC GOVERNING BOARD
3 PROGRAM ACTIVITIES IN THOUSANDS OF U.S. DOLLARS SINCE RELOCATION TO REPUBLIC OF KAZAKHSTAN
4 STATEMENT OF THE ISTC EXECUTIVE DIRECTOR
6 KEY EVENTS
8 CBRN PREPAREDNESS AND RESPONSE INITIATIVES
9 PREVENTION, PREPAREDNESS, AND RESPONSE TO NATURAL AND MANMADE DISASTERS IN SOUTHERN MEDITERRANEAN COUNTRIES
10 SEISMIC NETWORK EXPANSION IN THE CAUCASUS AND CENTRAL ASIA ISTC AND STCU COLLABORATE ON SEISMIC MONITORING
12 CAPACITY BUILDING FOR MEDICAL PREPAREDNESS AND RESPONSE TO CBRN INCIDENTS IN THE GULF COOPERATION COUNCIL COUNTRIES
13 EUROPEAN UNION CHEMICAL BIOLOGICAL RADIOLOGICAL NUCLEAR CENTRE OF EXCELLENCE
16 STRENGTHENING INTERNATIONAL SCIENCE AND TECHNOLOGY COOPERATION
17 EU RESTRICTIVE MEASURES TARGETED INITIATIVE
18 RESEARCH AND DEVELOPMENT PROJECTS
26 LIST OF COMPLETED PRJECTS IN 2023
27 ISTC ORGANISATIONAL STRUCTURE
28 CONTACT INFORMATION

MISSION

Creating peaceful multilateral S&T collaboration for a safer, more secure, and sustainable world.

VISION

To be the partner of choice in creating, facilitating, and expediting impactful world-class, peaceful multilateral S&T collaboration aimed at making the world safer, more secure, and more sustainable.

BENEFITS

The ISTC is open for business and actively seeking new membership. Under the ISTC Continuation Agreement entered into force in December 2017, non-member governments may now apply to become new members with a seat on the ISTC Governing Board.

Members benefits include:

- Diplomatic privileges and immunities
- Exemptions from certain customs duties
- Professional project management
- Proven project delivery
- International accounting standards
- Technical expertise
- Direct, tax-free grant payments
- Intellectual property protections
- Low-cost implementation
- Trusted scientific partnerships
- Multilingual, cross-functional teams
- On-site monitoring

Ronald F. Lehman, Ph.D.
Chair, Governing Board
International Science and Technology Center

Ronald F. Lehman II

STATEMENT OF THE CHAIRMAN OF THE ISTC GOVERNING BOARD

More great science is waiting to be done today on behalf of humanity than there are scientists, technicians, engineers, and mathematicians (STEM) around the world to do it. Even the largest, richest countries would find themselves falling well short of their potential if they were to isolate themselves from the intellectual talent, specialization, and dynamism found in other countries. At the same time, through international science engagement, smaller countries can leverage their strengths in specific scientific fields and applied technologies to access the broader S&T every nation needs.

And in this age in which science and technology (S&T) advances most rapidly when it is multidisciplinary, the value of international science and technology cooperation is even greater. And that value is multiplied yet again when the peaceful and beneficial applications of that science and technology is demonstrated through open and transparent cooperative science such as is done by the International Science and Technology Center (ISTC).

Many vehicles exist for scientific partnerships across national borders, but the ISTC remains special. In some ways, the ISTC is representative of the finest of such efforts. Following international best practices in both programs and administration, it meets the highest standards in areas ranging from efficiency, financial accounting, safety, and public transparency. While personal privacy and intellectual property are protected, the ISTC does no classified work.

In some other ways, the ISTC may be unique. The ISTC is an intensely intergovernmental body, working closely and by consensus with the governments of all the Parties over vast parts of the Globe. At the same time, the Parties team with experts from the private sector, academia, and non-governmental organizations to advance science and insure its responsible use.

The fundamental principles uniting the Parties participating in the ISTC are enduring. They recognize that technology is vital to the prosperity, health, and well-being of all nations, but that technology also carries with it risks. One sees that in the language of senior government officials, as early as February 1992, calling for the creation of such a center. Through the ISTC, institutions and individuals *"would contribute to ongoing efforts to reduce and eliminate weapons of mass destruction, including the development of technologies that could assist in those efforts. The center also would serve the wider goals of supporting the transition to market-based economies responsive to civilian needs, as well as supporting basic and applied research and technology development."*

The world has changed greatly since the ISTC was created. Nevertheless, the ISTC Parties have been very successful in adapting the ISTC to the changed circumstances. Clearly, humanity has continued to benefit in many ways from the improvements in medicine, transportation, communications, agriculture, education, energy, environment, and industrial productivity that has accelerated with the advance of responsible science and technology in recent years. At the same time, examples of the dangerous or irresponsible use or abuse of S&T

abound. Risk is inherent in everything we do, but the ISTC has shown itself to be a valuable tool to promote responsible science while also mitigating risks.

One vital step taken by the Parties to enhance the ability of the ISTC to advance S&T while reducing risks was the *"Agreement Continuing the International Science and Technology Center," "Done at Astana on 9 December 2015, in the Armenian, English, French, Georgian, German, Japanese, Kazakh, Korean, Kyrgyz, Norwegian, Russian, and Tajik languages, all language texts being equally authentic."* That the authentic texts would be in twelve different languages only hints at how the new agreement expanded the ability of the Science Center to go beyond a few regions and operate globally as approved by the Parties and participants.

As a result of the new agreement, participants from around the globe now regularly engage with the ISTC in programs, projects, training, seminars, and other activities. Interestingly, the official languages of the nearly 100 countries that have had citizens participate in various ISTC activities now total forty-five. While we often say that mathematics is the language of science, the diversity of different cultures with their own insights and needs has always been valuable to the advance of science.

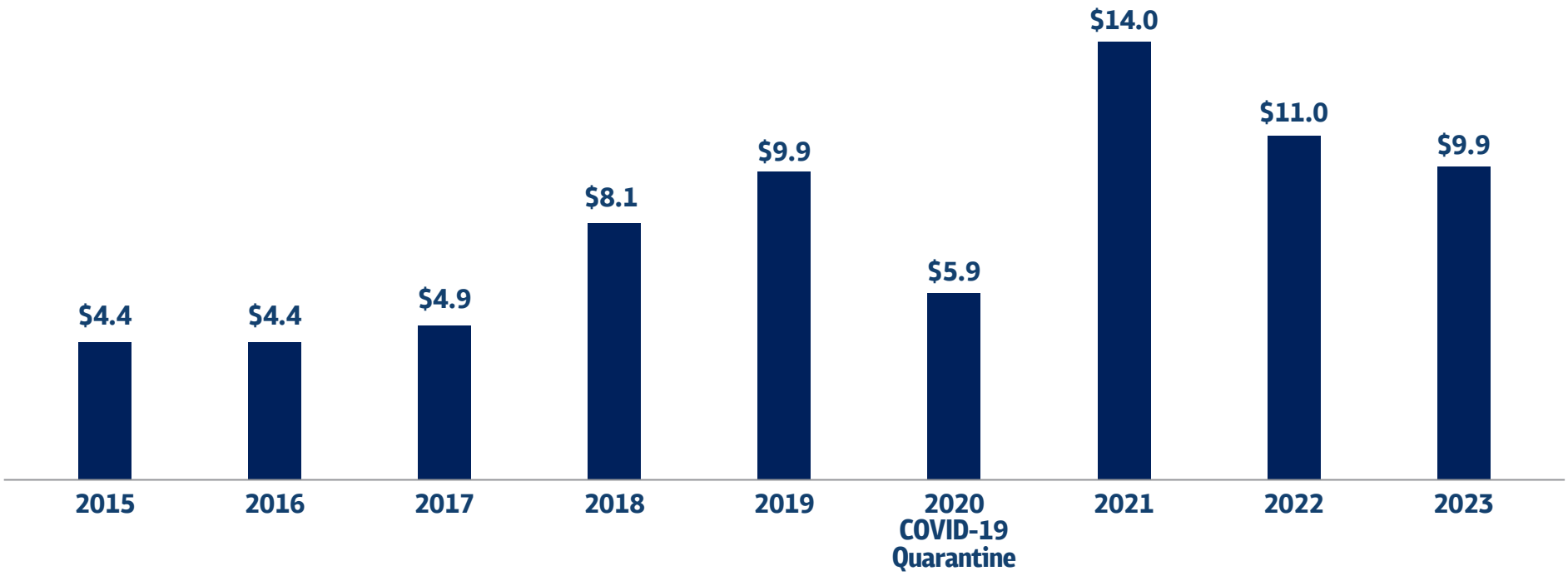
The new *"Agreement Continuing the International Science and Technology Center"* did more than expand the global reach of the ISTC. It provided a stronger legal foundation for the operation of the ISTC that includes diplomatic status and certain tax advantages. Unlike the original agreement, that was always provisional because not every Party had ratified it, the new Agreement has been ratified by all of the Parties, each in accordance with their own constitutional requirements. Other nations and/or their citizens may participate, but as is the case of all ISTC Governing Board decisions, a consensus vote is required. The consensus rule reassures all Parties that all actions are beneficial to each.

The basic purposes of the ISTC remain those for which it was originally established, but the new agreement does permit more flexibility in scope as well. This is summarized in Article 2, Section B, Subsection iv of the agreement as follows, in that the ISTC shall continue:

"To continue through its activities: to the development of international scientific partnership, strengthening global security, and fostering economic growth through innovation; to basic and applied research and technology development and commercialization, inter alia, in the fields of environment, energy, health, and nuclear, chemical, and biological safety and security; and to promoting the further integration of scientists with technologies, material, and expertise applicable to WMD into the international scientific community."

On behalf of the ISTC Governing Board whose members represent the forward-thinking Parties to this innovative intergovernmental body, I wish to express special appreciation to the Government of Kazakhstan for hosting the ISTC headquarters. And because people are the strength of all that we do, we want to acknowledge the vital role of the scientists and institutions that participate and the essential contributions of the Executive Director and his staff at the headquarters and in the Branch Offices.

ISTC PROGRAM ACTIVITIES 2015–2023
IN $ MILLIONS



David Cleave
Executive Director
International Science & Technology Center

STATEMENT OF THE ISTC EXECUTIVE DIRECTOR

As I reflect on the achievements of the past year, it is with great pride that I present ISTC's 2023 Annual Report to showcase our Center's impactful contributions to global scientific collaboration to promote nonproliferation and facilitate S&T engagement to promote international security.

Throughout the year, ISTC activities supported its commitment to fostering scientific collaboration and capacity building across borders, strengthening partnerships between scientists, researchers, and innovators from around the world through implementation of projects that facilitated exchange of knowledge and expertise in key areas such as nuclear safety and security, biotechnology, water security, seismic cooperation, environmental protection, and public health. cooperation. Our commitment to promoting peaceful uses of science has been unwavering, as we strive to address global challenges through capacity building, innovation and cooperation which has been a cornerstone of our work.

Despite ongoing global challenges, ISTC continued to be a beacon of collaboration and innovation. Our partnerships with member countries, international organizations, research institutions and industry enabled us to forge new paths in science and technology cooperation.

Despite ongoing global challenges in 2023, ISTC saw a marked increase in the volume of funded projects and activities. Continued expansion of activities to non-ISTC member countries shows ISTC's agility and capability to successfully implement projects worldwide.

A few notable funded projects that started in 2023 included:

- A partnership with the European Union's Chemical, Biological, Radiological and Nuclear (CBRN) Centres of Excellence (COE) to build capacity for medical preparedness and response to in the Persian Gulf region. The ISTC administered a train the trainer workshop in Abu Dhabi for 45 future trainers from the Gulf States. The project will enhance systems in place for medical emergency response to regional CBRN events, by establishing sustainable training centers with qualified instructors and standardized curricula for first-line and second-line responders, including paramedics, doctors and nurses.

- A project addressing Prevention, Preparedness, and Response to Natural and Man-made Disasters in Southern and Eastern Mediterranean European Union countries (PPRD Med). The project will strengthen CBRN medical emergency preparedness and response in the region to minimize health consequences following CBRN incidents, crises and events. And, a similar project will commence in Southeast Asia in 2024. A project to enhance CBRN critical infrastructure protection and security in Southeast and Eastern Europe and Central Asia to strengthen protection and security measures for national CBRN critical infrastructure facilities and practices and ensure minimization of consequences of attacks and breaches at facilities is in motion.

- A U.S. Department of State funded capacity building program, Foundational Infrastructure for Responsible Use of Small Modular Reactor Technology (FIRST), to support the responsible deployment of secure and safe small modular reactor (SMR) technology for a subset of ISTC and non-ISTC countries. As part of the FIRST program, the U.S. leveraged ISTC to launch Project Phoenix, designed to support coal-to-SMR conversions for a clean and secure energy future, via a multi-country workshop co-hosted with Slovakia in Bratislava in November 2023.

2023 also marked culmination of a two-year strategic review of the Center by the ISTC Secretariat and the Parties to examine the current and future threat environment and lay out long-term operational objectives and goals to help ISTC create, facilitate, and expedite impactful, world-class, peaceful and multilateral S&T collaboration. The resulting — Governing Board approved Strategic Roadmap introduces ISTC's new mission and vision and outlines operational objectives, and implementing actions the Center will undertake between 2024 to 2030 to meet its mission. Although implementation of the Strategic Roadmap will begin in early 2024, Japan already announced its support for ISTC participation in the Osaka World Expo in 2025, which directly supports ISTC's objective to support peaceful and safe S&T partnerships to prevent global and transregional weapons of mass destruction proliferation and encourage scientific collaboration consistent with ISTC Strategic Priorities.

As we look ahead to the future, ISTC remains steadfast in its mission to create peaceful multilateral S&T collaboration for a safer, more secure, and sustainable world. We are committed to expanding our reach and impact, leveraging our expertise in all our areas of interest to drive positive change on a global scale.

2024 will mark the 30th Anniversary of the ISTC where we intend to celebrate three decades of achievements and more importantly continue to look towards the future to create peaceful multilateral S&T collaboration for a safer, more secure, and sustainable world.

I extend my gratitude to the Governing Board, the Parties, ISTC partners and project participants, and the dedicated ISTC team, for their unwavering commitment, support and enthusiasm to our shared goals in advancing the mission of the ISTC. Together, we have made significant strides towards a more sustainable and prosperous future through capacity building and the ongoing mitigation of CBRN risks to make the world a safer place and shaping a brighter future for generations to come.

January	February	March	April	May	June
Pakistan		United Arab Emirates	Kazakhstan	Armenia	Japan, Kazakhstan

KEY EVENTS

A two-day workshop on preparedness and response for mass gatherings and other health threats was conducted. The National Institute of Health of Pakistan (NIH) organized these events and gathered over 100 experts of Pakistan in water and sanitation, food, chemical, hygiene and public health safety. As part of the training a field exercise was organized within a scenario of a mass gathering event. The purpose of the workshop and the field exercise was to enhance public health preparedness of different sectors and their roles in public health emergency management.

Organized online workshop, *Implementation of Master Programs on Strategic Trade Control* in cooperation with the Bishkek Export Control Center, funded by the EU under cooperation of the Targeted Initiative on Export Control. Participants from the EU, Ukraine, Georgia, Kazakhstan, and Kyrgyzstan shared practical experiences, information, problems and perspectives; and identified key areas of cooperation in implementing Master's degree programs in Strategic Trade Control.

Supported a two-week train-the-trainers regional course funded by the EU on *Modern Chemical, Biological, Radiological, and Nuclear Emergency* for 45 medical professionals from Gulf Cooperation Council countries at the Abu Dhabi Civil Defense Academy. The training provided advanced specialized training in urgent medical assistance during potential CBRN disaster situations.

In partnership with the Kazakhstan Physical Society, Al Farabi Kazakh National University, the Asia Pacific Center for Theoretical Physics, and the Institute of Nuclear Physics, organized an international conference to address current issues of modern physics at the Faculty of Physics and Technology of Al-Farabi Kazakh National University in Almaty.

Organized a Radio Frequency Timer Workshop at the Alikhanyan National Science Laboratory of the Yerevan Physics Institute in Yerevan. The workshop explored potential field applications and next steps for cooperation to advance a radio frequency timer device developed under and ISTC project funded by the Japanese Government.

Attended an International Planning Meeting organized by the Japan Association for the 2025 World Exposition in Osaka to prepare for ISTC's participation in Expo 2025 in Osaka, Japan.

Helped organize the third Annual Meeting of the Kazakhstan Physical Society at the National Nuclear Center in Almaty. Speakers from leading scientific organizations and institutions in Kazakhstan, the United States, France, Japan and Turkey presented the latest achievements in modern physics, physical technology, associated problems, prospects for further development of current areas of physical science, and nuclear energy.

July	August	September	October	November	December
 Kyrgyz Republic	 Armenia, Georgia Kazakhstan, Kyrgyzstan Tajikistan	 Kazakhstan	 Spain	 Japan	 Tajikistan
Organized a National Training on Ensuring Water, Food, and Chemical Safety in Mass Events and Command, Control, and Communication in Public Health in Bishkek. The events were under the supervision of the Kyrgyz Ministry of Natural Resources, Ecology as part of an EU funded project that addresses preparedness and response for mass gatherings and other health threats in Central Asia.	Conducted project proposal training for scientists in Armenia, Georgia, Kazakhstan, Kyrgyzstan, and Tajikistan to familiarize researchers with the Center's upgraded proposal submission and feedback website.	Attended the 30th Anniversary of the Nuclear Society of Kazakhstan seminar The Role of International Cooperation peaceful use of Nuclear Energy, arranged by the Nuclear Society of Kazakhstan. The seminar was attended by key players in the Nuclear Industry in Kazakhstan. David Cleave, ISTC Executive Director, presented on "The role of ISTC in solving problems of non-proliferation of weapons of mass destruction (WMD)".	Prevention, Preparedness, and Response to Natural and Manmade Disasters in Southern Mediterranean Countries project held its 1st Steering Committee meeting in Barcelona. The meeting marked a pivotal moment in advancing the goals of the Union for the Mediterranean (UfM) and the PPRD Med program. This gathering reflects a strong commitment to advancing regional cooperation in disaster risk reduction and civil protection in the Mediterranean region.	Organized trips funded by Japan to strengthen ISTC's international networks, such as to the Science and Technology in Society Forum in Kyoto, 25th Anniversary Young Researcher award winners in Tokyo, BioJapan in Yokohama and the World Smart Energy Week in Osaka.	Organized a EU funded seminar in Dushanbe to address control of dual-use technology exports, including WMD. The event assembled representatives from the Tajikistan National Academy of Sciences and students of pilot universities in Tajikistan to discuss the potential WMD threat from terrorist organizations.

CBRN PREPAREDNESS AND RESPONSE INITIATIVES

In 2023, the EU funded a series of preparedness and response capacity building projects in cooperation with its CBRN Centres of Excellence. This thematic focus across several regions leverages the ISTC's effectiveness in implementing multilateral capacity projects and its global scientific partnerships.

Preparedness and Response for Mass Gatherings and Other Health Threats in Central Asia focused on multidimensional aspects. The project aims to improve food and water safety during mass events, guard against chemical threats, ensure efficient public health command, control, and communication systems, provide necessary resources, and develop tabletop exercises to test national plans.

Activities over the year included high level national training courses in Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, and Uzbekistan. These events built on a successful train-the-trainer effort in 2022. Newly qualified master trainers successfully led high-level courses for over 1,000 people. In addition, a project technical expert participated in the

World Health Organization's Conference on Poison Centers to facilitate collaboration, contributing to opening of Information Poison Centers in Central Asia.

PREVENTION, PREPAREDNESS, AND RESPONSE TO NATURAL AND MANMADE DISASTERS IN SOUTHERN MEDITERRANEAN COUNTRIES

The project enhance cooperation and partnership between the EU and Mediterranean nations through the Union for the Mediterranean in the following areas:

- Use earth observation and artificial Intelligence-powered algorithms to unlock the potential of earth observation to identify areas at risk, monitor the impact of natural disasters in real-time, mitigate associated risks from natural-induced technological risks (NATechs), and improve prevention and preparedness for impacts of climate change.

- Collaborate with the EU CBRN Centers of Excellence and Critical Infrastructures programs to establish connections between the CBRN components of civil protection and NATechs.

Develop a digital platform for information sharing and exchange on regional expertise and training sessions, and to facilitate exchanges in case of catastrophic events.

Participating countries: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Mauritania, Morocco, Palestine, and Tunisia.

Achievements as of December 31, 2023

- The first use of the beta version on September 12 of the PPRD Med Intelligence platform was in response to a natural disaster. Case study of the Derna disaster in Libya (collapse of two dams with a cascading effect following a storm and heavy rain on September 11, 2023. More than 15,000 victims in a couple of hours. The catastrophe triggered the support of regional countries, creating a complex situation to coordinate and a lack of real-time information on for the early

emergency teams in a dangerous situation. PPRD Med partner countries Tunisia and Algeria sent USAR teams to help Libyan Civil Protection.

- Creation of eight tailored roadmaps describing priorities by countries and activities to implement for 2024, focusing on flood simulation and modelling at first in semester one and wildfire, simulation and modelling by the end of the year.

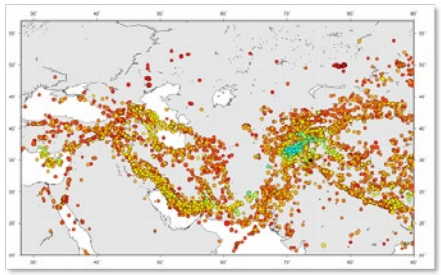
Images illustrating the results. It is a new approach applying AI-powered algorithms to satellite data for environmental safety in Civil Protection or Civil Defense bodies to prevent and prepare teams. PPRD Med's results during the launch phase became a trigger to develop satellite imagery for first responders and to monitor critical infrastructures. At least four new PPRD Med projects, funded by DG ECHO and DG NEAR, are being designed by ISTC for implementation in early 2025.

SEISMIC NETWORK EXPANSION IN THE CAUCASUS AND CENTRAL ASIA: ISTC AND STCU COLLABORATE ON SEISMIC MONITORING

Central Asia and the Caucasus are earthquake territories. ISTC and the Science and Technology Center in Ukraine are cooperating to support seismic safety in this large geographic area.

Countries in these regions are in one of the world's most seismically active tectonic zones. Between 1900 and 2020, more than 5,000 earthquakes with a magnitude of 5.0 or greater on the Richter Scale were recorded from Turkey east to the Himalayas. Earthquakes do not have national boundaries, and effective national-level monitoring and response is strengthened by regional engagement and trans-border cooperation. From the devastating quake in Turkmenistan in 1948, which caused over 100,000 casualties, to the 1966 quake in Uzbekistan to the Spitak quake in Armenia that killed 25,000 in 1988, to the early 2023 temblor in central Turkey and Western Syria and, most recently, the quake on the China-Kyrgyzstan border which shook as far away as Almaty, countries adjacent to and in Central Asia and the Caucasus experience one of the world's most seismically active tectonic zones, known as the Alpine-Himalayan orogeny, or mountain formation.

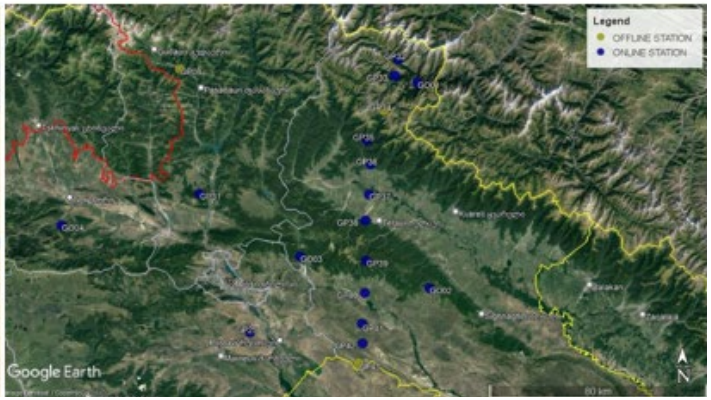
Earthquake preparation and response is a way of life for diverse cultures in different countries in this region. Through the Seismic Network Expansion in the Caucasus and Central Asia, or SNECCA, project across Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, and Tajikistan, ISTC and the Science and Technology Center in Ukraine collaborate with prestigious research and government organizations to strengthen seismic monitoring and earthquake response in Central Asia and the Caucasus by expanding seismic networks with high-quality broadband equipment and strong motion sites.



With a budget of just over $5 million through the United States Department of Energy's National Nuclear Security Administration and in collaboration with the Lawrence Livermore National Laboratory, Michigan State University, and the EarthScope Consortium, the SNECCA project offers best-practice training and technical support for site selection, installation, and operation to address national seismic monitoring in six countries in Central Asia and the Caucasus. SNECCA cost-effectively deployed seismic monitoring equipment, which is tax-free.

SNECCA commenced in September of 2018 in Tbilisi, Georgia.

The multi-year project includes installation of over 50 strategically placed broadband seismic sensors in the six Central Asia and Caucasus countries to enhance seismic monitoring capabilities in the region. But earthquakes are just one natural



phenomenon SNECCA addresses. More than 20 additional semi-broadband stations have been set up to monitor volcanoes and mud volcanic objects at local levels. In major cities, Autonomous strong-motion sensors were also deployed to provide further insight into ground motion, which helps monitor earthquakes and volcanoes. In addition to participating nations in SNECCA, real-time data from the new seismic stations is available to the global scientific community.

The SNECCA project contributes to modernizing each participating country's server systems, which ensures rapid transition, collection, and processing of seismic data whose utility depends on equipment quality, infrastructure, and location. Project teams meticulously identify suitable sites for permanent stations installation. For each station, the project team conducts thorough assessments of seismic noise sources and local geological properties, utilizing existing geological maps to aid evaluations. Some maps were initially available only in paper format, prompting teams to organize several training sessions to digitize them. GIS systems, specifically ArcGIS, were provided to each collaborating team that supported one another in installing the seismic stations.

Project implementation allows significant improvements in seismic monitoring systems, strong motion networks, and regional data processing for earthquake studies. Earthquakes and mountain building are phenomena without national boundaries and necessitate cross-border cooperation. Participation in the SNECCA project enables each country to enhance its monitoring capabilities by incorporating data from neighboring regions. This maximizes analytical output by including data recorded at varying distances from earthquakes. Accurately determining the epicenter of an earthquake is crucial for both response efforts and assessing its severity, and real-time data sharing among countries enhances precision of an earthquake location in border areas, enabling neighboring governments to collaborate on effective rapid response strategies. Real-time data exchange enhances seismic data by promoting widespread data use and identifying and resolving quality issues. Importantly, data sharing fosters regional awareness and joint responses to regional earthquake threats.

CAPACITY BUILDING FOR MEDICAL PREPAREDNESS AND RESPONSE TO CBRN INCIDENTS IN THE GULF COOPERATION COUNCIL COUNTRIES

A collaborative effort between the European Union, Gulf Cooperation Council countries (the United Arab Emirates, Saudi Arabia, Kuwait, Oman, Qatar, and Bahrain), and the United Nations Interregional Crime and Justice Research Institute the project aims to strengthen existing systems for emergency medical response to CBRN events, including natural, accidental and malignant events in GCC region.

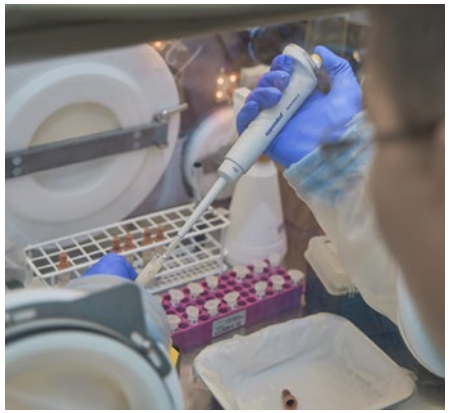
In 2023 a significant milestone was train the trainer for 50 participants from GCC partner countries. The course covered CBRN event overviews, specialized medical assistance application, practical injury management and other critical competencies. The project also established a regional network to connect participants, direct responders, institutions, and national training centers involved in CBRN emergency response.

EUROPEAN UNION CHEMICAL BIOLOGICAL RADIOLOGICAL NUCLEAR CENTRE OF EXCELLENCE

Strengthening the National Legal Framework and Provision of Specialized Training on Biosafety and Biosecurity in Central Asian Countries

One of the key lessons learned from the COVID-19 pandemic is the need for continued education and training of medical and laboratory specialists in biosafety (prevention of pathogens spreading — and biosecurity — prevention of harmful organism being used for ill intent — as well as having appropriate legislation in place to establish operational frameworks to assure protection of the general public of highly infectious disease outbreaks.

Well before the start of the COVID-19 pandemic (December 2015), a project set out to enhance national legal frameworks of participating countries and to provide specialized training on biosafety and biosecurity in Central Asian countries. However, in 2020 the project pivoted and expanded to address COVID-19 pandemic needs in Central Asia, South East, and Eastern Europe. The project was successfully concluded in March 2023, with a final budget of €8.5 million.



The project resulted in:

- Delivery of over €3.1 million in biosafety/biosecurity, diagnostic equipment, materials and supplies to partner countries, including almost €1 million to address COVID-19 needs.
- 155 partner country trainers trained by international experts in biosafety and biosecurity.
- More than 4,200 medical and veterinary specialists, policy makers, and emergency response personnel trained in over 240 workshops
- Qualified partner country experts in sampling, processing, transport and diagnostics of highly infectious diseases, biological waste management and, risk assessment of bio labs and medical facilities.
- Two mobile disease surveillance labs provided to Uzbekistan, along with four training workshops and two field exercises and enforcement of a new Tajik law on biosafety and biosecurity. Additional Central Asian partner countries have reported working on similar laws.
- Co-organized two inter-regional Association of Central Asia and the Caucuses (BACAC) conference (2019 and 2022), supporting specialists from partner countries to exchange best practices, create networks and discuss preparation for future outbreaks.

Partner Countries: Afghanistan, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, Uzbekistan, Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, and Ukraine.

EUROPEAN UNION CHEMICAL BIOLOGICAL RADIOLOGICAL NUCLEAR CENTRE OF EXCELLENCE

Enhancement of CBRN Critical Infrastructure Protection and Security In South East and Eastern Europe And Central Asia

Major industrial accidents of the past, such as the Chernobyl Nuclear Disaster (Ukraine, 1986), the Bhopal Gas Tragedy (India, 1984), or the Beirut Explosion (Lebanon, 2020), demonstrate the major, long-term public health, environmental and economic risks of incidents at CBRN facilities. The invasion by Russia into Ukraine has highlighted risks when CBRN facilities come under attack and how this can be used for terroristic or extortion purposes.

The risk of disastrous incidents is increasing as rogue states, criminal enterprises and terrorist groups are becoming more sophisticated and aggressive in hacking operational systems at CBRN facilities. The project aims to strengthen and enhance protection and security measures for national CBRN Critical Infrastructure facilities and practices to ensure minimization of consequences of attacks and breaches at such facilities, by:

- Strengthening horizontal coordination between different state organizations responsible for protection and security of CBRN facilities.
- Enhancing risk assessment of CBRN Critical Infrastructure facilities.
- Enhancing physical and cyber security capabilities/capacities.
- Stimulating exchange of best practices and networking.

Partner Countries: Iraq, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Mongolia, Pakistan, Tajikistan, Uzbekistan, Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia and Ukraine.

EUROPEAN UNION CHEMICAL BIOLOGICAL RADIOLOGICAL NUCLEAR CENTRE OF EXCELLENCE

Strengthening CBRN Medical Emergency Preparedness and Response in Southeast Asia

When chemical (C), biological (B), radiological (R) or nuclear (N) incidents occur, whether natural, accidental or deliberate in origin, a diverse group of stakeholders play critical roles in the rapid response to an incident. Each stakeholder, such as law enforcement agencies, emergency-response personnel and medical experts, have different roles and objectives that at times might not align or are conflicting.

It is critical that each country can deploy collaborative CBRN multi-hazard medical emergency preparedness and response plans (strategic and operational) and associated capabilities with the primary aim to increase survival and reduce the suffering of victims of CBRN incidents, which the program to addresses by:

- Increase regional awareness and cooperation among stakeholders about the importance of CBRN medical preparedness, detection, response and related good practices.
- Enhance competency of national technical personnel involved in CBRN medical response with a focus on: a) scene management b) prehospital medical care c) hospital medical care d) emergencies at points of entry.
- Enhance national technical competency to investigate infectious disease events implementing various

Partner Countries: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand and Vietnam.

STRENGTHENING INTERNATIONAL SCIENCE AND TECHNOLOGY COOPERATION

In 2023, Japan provided funding for the ISTC to facilitate participation of several member country scientists in key scientific conferences and events including:

The 20th Annual Science and Technology in Society Forum and Young Leaders Program

Three distinguished scientists from Georgia, Kazakhstan and Kyrgyzstan participated in the 20th Annual Science and Technology in Society (STS) Forum and Young Leaders Program in Kyoto, Japan. Established in 2004, the STS Forum aims to provide a platform for world leaders in policymaking, academia, and industries to gather and discuss science and technology issues for the future of humankind. The Forum explored emerging technologies such as artificial intelligence, biotechnology and quantum computing; discussed issues associated with climate change, healthcare and food security; addressed policy formulation backed by initiatives supporting scientific research and innovation; and reviewed cross sector partnerships between government, academia and industry that bridge gaps, foster innovation and translate scientific discoveries into practical applications addressing real-world challenges.

BioJapan 2023

Four researchers from Kyrgyzstan and Tajikistan participated in the BioJapan exhibition in Yokohama, Japan.

BioJapan is an annual partnering event for the global biotechnology industry. It is the world's oldest biotechnology exhibition going back to the mid-1980s and focuses on regenerative medicine, digital technology and life science. Industry, academia and government come together to network and discuss research trends and scientific progress.

At BioJapan 2023, more than 800 companies, including international organizations, exhibited in Yokohama, and about 15,000 people visited and engaged in discussions, information exchange, and business meetings.

World Smart Energy Week

Astana IT University from Kazakhstan and the Association of Renewable Energy of Tajikistan participated in the World Smart Energy Week event in Osaka, Japan.

Renewable energy is expected to play a more significant role in achieving carbon neutrality by 2050. Smart Energy Week is an exhibition that gathers the latest technologies, information, and people to accelerate business in the energy industry.

Four Kazakh and Tajik participants met with Japanese colleagues and participated in the World Smart Energy Week's activities focusing on hydrogen and fuel cell technologies, rechargeable batteries, smart grid, wind energy, biomass power, thermal power and recycling renewable energy resources.

Scientific Travel Mission, Japan for ISTC Young Scientist Award Winners

In 2019, Japan offered a scientific visit to Japan as a supplemental prize for a special ISTC 25th Anniversary award for young scientists. Although the trip was postponed during the COVID-19 pandemic, Japan was eager to fulfill its commitment to the award winners from four countries.

Award winners are a researcher from the Ilia Vekua Sukhumi Institute of Physics and Technology in Georgia, student from National Academy of Sciences in Armenia, a researcher from the National Academy of Sciences in Tajikistan, and a freelance researcher in Kazakhstan.

The long-anticipated trip was meaningful; researchers visited Japan's facilities for advanced quantum and nuclear energy such as the High Energy Accelerator Research Organization, the National Institutes for Quantum Science and Technology and the Japan Atomic Energy Agency. The group visited the historic Hiroshima Peace Memorial Museum and met with Kitagawa Katsuro, Assistant Minister, Director-General of the Disarmament, Nonpoliferation and Science Department.

EUROPEAN UNION RESTRICTIVE MEASURES TARGETED INITIATIVE

The project aims to address circumvention of EU sanctions against Russia and Belarus, which are implemented due to their ongoing aggression against Ukraine. The project will inform governmental representatives and commercial operators on the scope of EU sanctions and current trade trends that might indicate circumvention, in effort to work together with governments and private industry to maximize the impact of sanctions on Russia and Belarus and maximize the effects on legitimate trade with the EU. In 2023, seminars were organized in Armenia, Kazakhstan, Kyrgyzstan, Turkiye, and Uzbekistan.

RESEARCH AND DEVELOPMENT PROJECTS

Republic of Armenia

Target-directed synthesis and screening of antiviral (anti-SARS-CoV) and antibacterial compounds based on non-proteinogenic amino acids, peptides and polymers

The project holds significant importance in combating critical health challenges, including antibiotic resistance and viral infections. By targeting specific enzymes, the research aims to develop novel compounds with potent antiviral and antibacterial properties. The research results collectively demonstrate progress in developing novel compounds and technologies with significant implications for combating infectious diseases and addressing antibiotic resistance. Ultimately, this project has the potential to enhance public health.

Leading Institute	Yerevan State University, Yerevan, Armenia
Participant Institutes	Agricultural University of Georgia, Tbilisi; Georgia Scientific and Production Center "Armbiotechnology", Yerevan, Armenia
Foreign Collaborators	Nagoya Institute of Technology, Nagoya, Japan; Polytechnic University of Catalonia, Barcelona, Spain; University of California San Diego, San Diego, CA, USA; University of Paris-Saclay, Paris, France; University of Texas at San Antonio, San Antonio, USA; University Rostock, Rostock, Germany; University of Nantes, Nantes, France
Project Duration	April 2022 – March 2025
Funding Parties	Japan
Budget	$494,000

Republic of Georgia

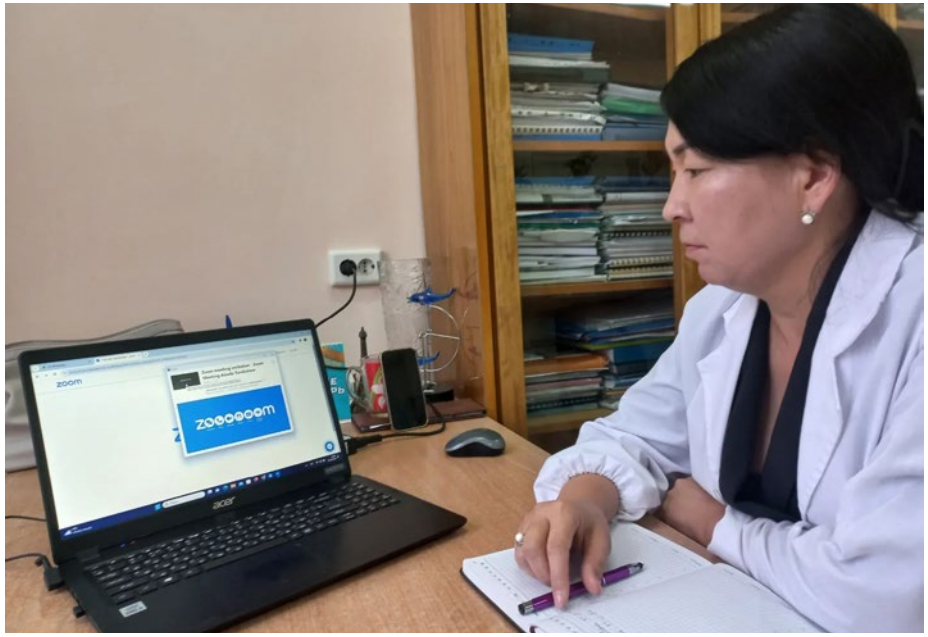
Scientific substantiation of the possibility of creating new bactericidal zeolite filter materials for purification-decontamination of water from various sources

The possibilities for effective purification and decontamination of the aquatic environment and the possibility of reducing the degree of radioactive contamination are very important for ensuring Water Safety and Security, Biosafety and Biosecurity.

Within the framework of the project, new zeolite filtering materials for water purification and disinfection will be obtained, and methods for their preparation will be developed.

Achievement of the project goal will create the prerequisites for the development of new technologies to produce zeolite-containing filters in the future.

Leading Institute	Ivane Javakhishvili Tbilisi State University; Tbilisi, Georgia
Participant Institutes	Armenian National Agrarian University; Yerevan, Armenia M. Auezov South Kazakhstan State University; Shymkent, Kazakhstan
Foreign Collaborators	Benaki Phytopathological Institute, Athens, Greece; Chiba University, Chiba, Japan; Gifu University, Gifu, Japan; Indiana University, Bloomington, USA; Sofia University, Sofia, Bulgaria; Swedish University of Agricultural Sciences, Alnarp, Sweden; University of Mining and Geology, Sofia, Bulgaria
Project Duration	May 2022 – April 2025
Funding Parties	Japan
Budget	$367,280



Republic of Georgia

Enhancing thermoelectric conversion performance of cobalt-based oxide materials through doping and microstructure modulation

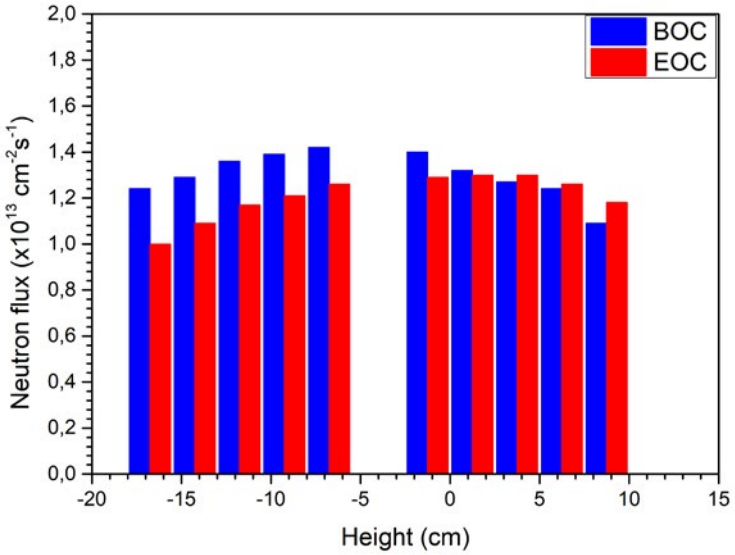
Eco-friendly thermoelectric technology offers a clean energy solution by converting waste heat into electricity. The development of advanced thermoelectric materials is key to expanding the use of thermoelectric generators. A collaborative team from Georgia and Armenia is focused on improving the thermoelectric conversion efficiency of cobaltite materials. The project is on track, with the high-level international expertise of Japanese and Hungarian collaborators playing a vital role in its success.

Leading Institute	Georgian Technical University; Tbilisi, Georgia
Participant Institutes	Institute for Physical Research of National Academy of Sciences; Yerevan, Armenia
Foreign Collaborators	Nagaoka University of Technologyy; Nagaoka, Japan Research Institute for Technical Physics and Materials Science; Budapest, Hungary
Project Duration	October 2022 – March 2025
Funding Parties	Japan
Budget	$200,000

Republic of Kazakhstan

Study of radiation resistance of cables with mineral insulation

Results obtained under the project will contribute to development of reactor technologies to ensure safety of nuclear reactors. The state of physical processes in a nuclear reactor must be monitored both during its normal operation and in emergency situations. Any severe accident is characterized by a significant change in reactor parameters such as radiation dose, temperature and environment (for example, a change in the state of aggregation of the coolant). It is necessary to ensure reliable control of the reactor parameters, which is possible when using radiation-resistant equipment, including cables for transmitting an electrical signal. The project contributes to technological modernization of the nuclear power industry and provides long-term operation of signal cables in the reactors of existing and next generations.



Leading Institute	Institute of Nuclear Physics; Almaty, Kazakhstan
Foreign Collaborators	Japan Atomic Energy Agency (JAEA); Tokai-mura, Japan
Project Duration	April 2022 – September 2024
Funding Parties	Japan
Budget	$330,000

Republic of Kazakhstan

Evaluating the ecology and persistence of Brucellosis in livestock and wildlife in Kazakhstan and transmission potential to humans

Focus was on biosurveillance of humans and livestock in Kazakhstan of Brucellosis, which is an infectious disease that has economic and agricultural impact worldwide and human health risks because it can be transmitted from animals to humans. Twelve expeditions were undertaken to study the prevalence of Brucellosis in wildlife and livestock, and to study the type of Brucellosis circulating in wildlife and domesticated animals in Kazakhstan. Transmission between wildlife and livestock was studied to formulate cost-effective intervention strategies to reduce the burden of Brucellosis in Kazakhstan. It was determined that human cases during 2017 – 2021 were primarily caused by Brucella melitensis, or biovar III, which is the most common and virulent sheep type. Based on this information, farmers can be better informed about how to protect themselves while working with their livestock.

Leading Institute	Research Institute for Biological Safety Problems; Zhambyl, Kazakhstan
Participant Institutes	Scientific and Practical Center for Sanitary and Epidemiological Expertise and Monitoring; Astana, Kazakhstan National Reference Center of Veterinary; Astana, Kazakhstan
Foreign Collaborators	University of Florida; Gainesville, USA
Project Duration	September 2017 – August 2023
Funding Parties	University of Florida, USA
Budget	$533,000

Kyrgyzstan Republic

Expanding Global Knowledge of Tuberculosis by Creating a TB Portal in Kyrgyzstan

The project aims to enhance global research capabilities for tuberculosis (TB) by developing the Kyrgyzstan TB Portal. This portal aggregates a comprehensive dataset, including medical images, microbiology lab results, treatment information, bacterial genome data, as well as socio-economic and clinical details from anonymized records of Kyrgyzstan TB patients, primarily those with multidrug-resistant (MDR) and extensively drug-resistant (XDR) TB. By making this data accessible to the global TB research community, the portal facilitates advanced studies and collaborative efforts. In 2023, data from 339 samples across 151 patients were entered into the TB Portal.

Leading Institute	National Tuberculosis Center (NTC); Bishkek, Kyrgyzstan
Foreign Collaborators	National Institutes of Health/National Institute of Allergy and Infectious Diseases (NIH/NIAID); USA
Project Duration	January 2023 – December 2023
Funding Parties	U.S. Department of Health & Human Services/ National Institute of Allergy and Infectious Diseases/Office of Cyber Infrastructure and Computational Biology
Budget	$289,000

Republic of Tajikistan

Investigation and optimization of optoelectronic properties of cesium tin-trihalides (CsSnX3) for photovoltaic applications

Project aims to study and optimize the optoelectronic properties, synthesis, and stabilization of lead-free perovskite photoabsorbers based on sesium and tin trihalides as an alternative to Pb-containing thin-film solar cells, as well as establish a research laboratory for design and analysis of functional materials. The project concept is in line with the United Nations Sustainable Development Goals #7 and #13 and will contribute to achievement important international goals, such as stimulating action to reduce greenhouse gas emissions and encouraging adoption of environmentally friendly technologies.

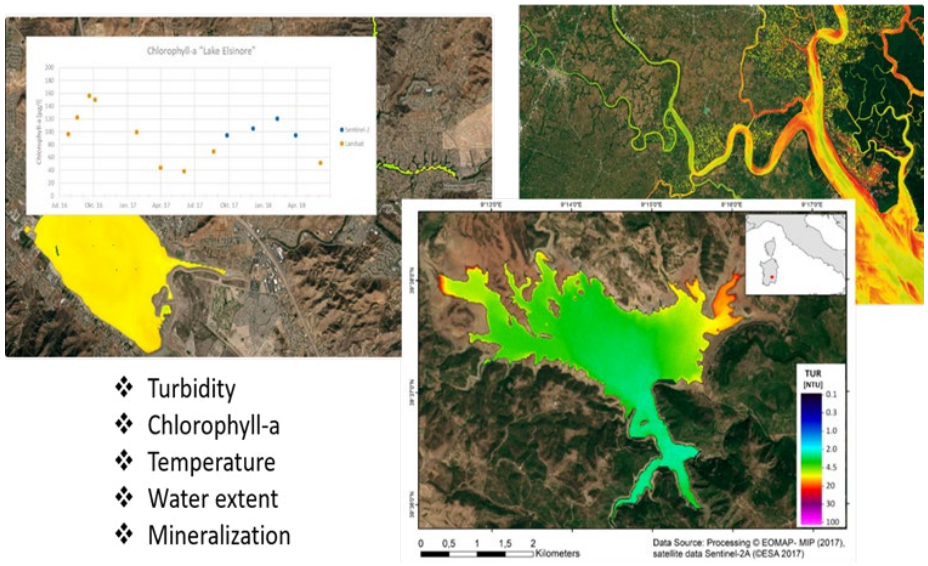
Leading Institute	S. U. Umarov Physical-Technical Institute of the National Academy of Sciences of Tajikistan
Foreign Collaborators	Waseda University; Tokyo, Japan
Project Duration	October 2022 – September 2025
Funding Parties	Japan
Budget	$590,000

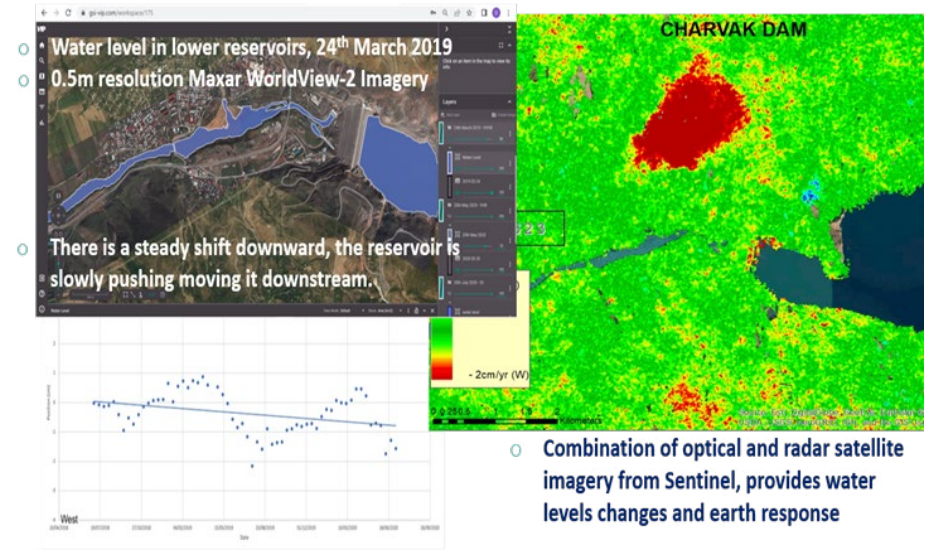
Republic of Tajikistan

Transboundary water and land resources monitoring in the Amu Darya basin using Earth Observation (EO)

The project addresses water and land resources management in Central Asia such as the lack of up-to-date, comprehensive data and information on water and land resources in the Amu Darya basin to inform management practices and support decision-making at regional, national, and local levels. Participants completed tasks improving capacity for collecting and managing high-quality data, enhancing monitoring networks, promoting collaboration to enable regular data and information exchange and fostering and encouraging data networks. Results include conducting a systematic literature review; collecting recent data from different sources and streamlining data collection and management; creating GIS and RS/EO-based maps, charts, and infographics that can be compiled into an easily accessible atlas, which in turn can be used to better monitor and evaluate transboundary water and land resources in the Amu Darya basin and inform management practices and support decision making in the region.

Leading Institute	IWPHEE Institute of Water Problems, Hydropower Engineering and Ecology; Tajikistan
Participant Institutes	Basin Water Organization "Amu Darya", M. Dulaty Taraz State University; American University of Central Asia
Foreign Partners	University of Twente; Enschede, Netherlands
Project Duration	April 2022 – October 2024
Funding Parties	EU
Budget	$321,000





LIST OF COMPLETED PROJECTS IN 2023

Project	Lead Institute	Funding by	Collaborator country
Evaluating the ecology and persistence of Brucella spp. in livestock and wildlife in Kazakhstan and transmission potential to humans	Research Institute for Biological Safety Problems of the Ministry of Health of the Republic of Kazakhstan, Ministry of Science and Higher Education of the Republic of Kazakhstan	USA, Kazakhstan	USA, Kazakhstan
Greenhouse Gases Utilization	Georgian Technical University	Japan	Japan, USA, Finland
Properties of the irradiated SiC-matrix.	Institute of Nuclear Physics of the Ministry of Energy of the Republic of Kazakhstan	Japan	Japan
Comparative study of the epidemiology of anthrax strains found in cattle burial grounds with human and animal cases in Northern Kazakhstan	Research Institute for Biological Safety Problems of the Ministry of Health of the Republic of Kazakhstan	France	France

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The new rebranded ISTC logo in 2023