Securing a Nuclear-Test-Free Tomorrow

The CTBT-LAC Partnership

CTBTO
PREPARATORY COMMISSION

Latin America and the Caribbean (LAC) has played a key role in global nuclear non-proliferation and disarmament efforts, setting an example of regional cooperation for peace and security.

A Collective Success Story: Universalising the CTBT in LAC

LAC's commitment to these goals was demonstrated during the negotiation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), driven by a shared vision to end nuclear testing and its associated risks.

Since the Treaty opened for signature in 1996, all 33 states in the region have signed and ratified it, with Dominica being the most recent in 2022, marking universal recognition across Latin America and the Caribbean. This region was also the first in the world to achieve full adherence to the Treaty. Celebrating this milestone, the country's Prime Minister at the time, Roosevelt Skerrit, called it a significant step towards "contributing to a safer and more secure world".

For the CTBT to enter into force, it requires ratification by 44 designated countries, known as Annex 2 States, which were identified as 'nuclear-capable' during the Treaty's negotiation - meaning they possessed nuclear power or research reactors at that time.

Notably, all six Annex 2 States in the LAC region - Argentina, Brazil, Chile, Colombia, Mexico, and Peru - have signed and ratified the Treaty.

Roosevelt Skerrit, Prime Minister of Dominica (at time of CTBT ratification)

Treaty of Tlatelolco: A Milestone in Nuclear Non-Proliferation & Disarmament

In 1967, the region made history with the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, also known as the Treaty of Tlatelolco. This agreement established the first nuclear-weapon-free zone (NWFZ) in a densely populated area, with 33 States Parties committing to ban nuclear weapons and all related activities across the continent. Crucially, the Treaty's first provision prohibits nuclear testing.

To ensure the Treaty of Tlatelolco's implementation, the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) was established in 1969. OPANAL plays a vital role in monitoring compliance and upholding the commitments made by the States Parties.

Ambassador Alfonso García Robles, Mexican diplomat and Nobel Peace Prize laureate addressing UN General Assembly, 1974

"Mankind is confronted with a choice: we must halt the arms race and proceed to disarmament or face annihilation."

- Ambassador Alfonso García Robles, Mexican diplomat and Nobel Peace Prize laureate, who shaped and implemented the Treaty of Tlatelolco.

Preliminary Meeting for Constitution of Organization for Prohibition of Nuclear Weapons in Latin America, Mexico, 1969 (Credit OPANAL)

In 2002, OPANAL and the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) formalised their partnership through an agreement that promotes regular consultations, mutual representation at meetings, and the exchange of information to advance their shared mission of banning nuclear test explosions.

The CTBTO expanded these efforts in 2005 by forging a similar agreement with the Association of Caribbean States (ACS).

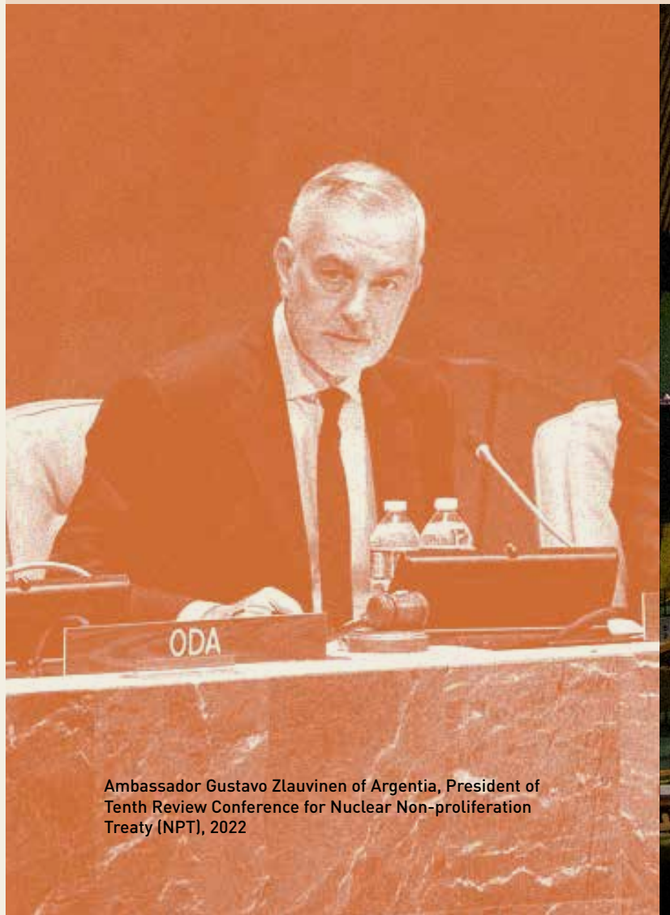
LAC and the Nuclear Non-Proliferation Treaty (NPT)

All 33 states in Latin America and the Caribbean are party to the 1968 Nuclear Non-Proliferation Treaty (NPT) as non-nuclear weapon states.

The NPT is designed to curb the spread of nuclear weapons and related technology, while also promoting disarmament and the peaceful use of nuclear energy.

The Link Between the NPT and the CTBT

The NPT and the CTBT are closely interconnected. While the NPT focuses on preventing the spread of nuclear weapons, its preamble explicitly calls for the "discontinuance of all test explosions of nuclear weapons for all time", highlighting the urgent need for a global ban on nuclear testing.



Ambassador Gustavo Zlauvinen of Argentia, President of Tenth Review Conference for Nuclear Non-proliferation Treaty (NPT), 2022

Opening of Tenth Review Conference of Parties to Treaty on Non-Proliferation of Nuclear Weapons (NPT), 2022

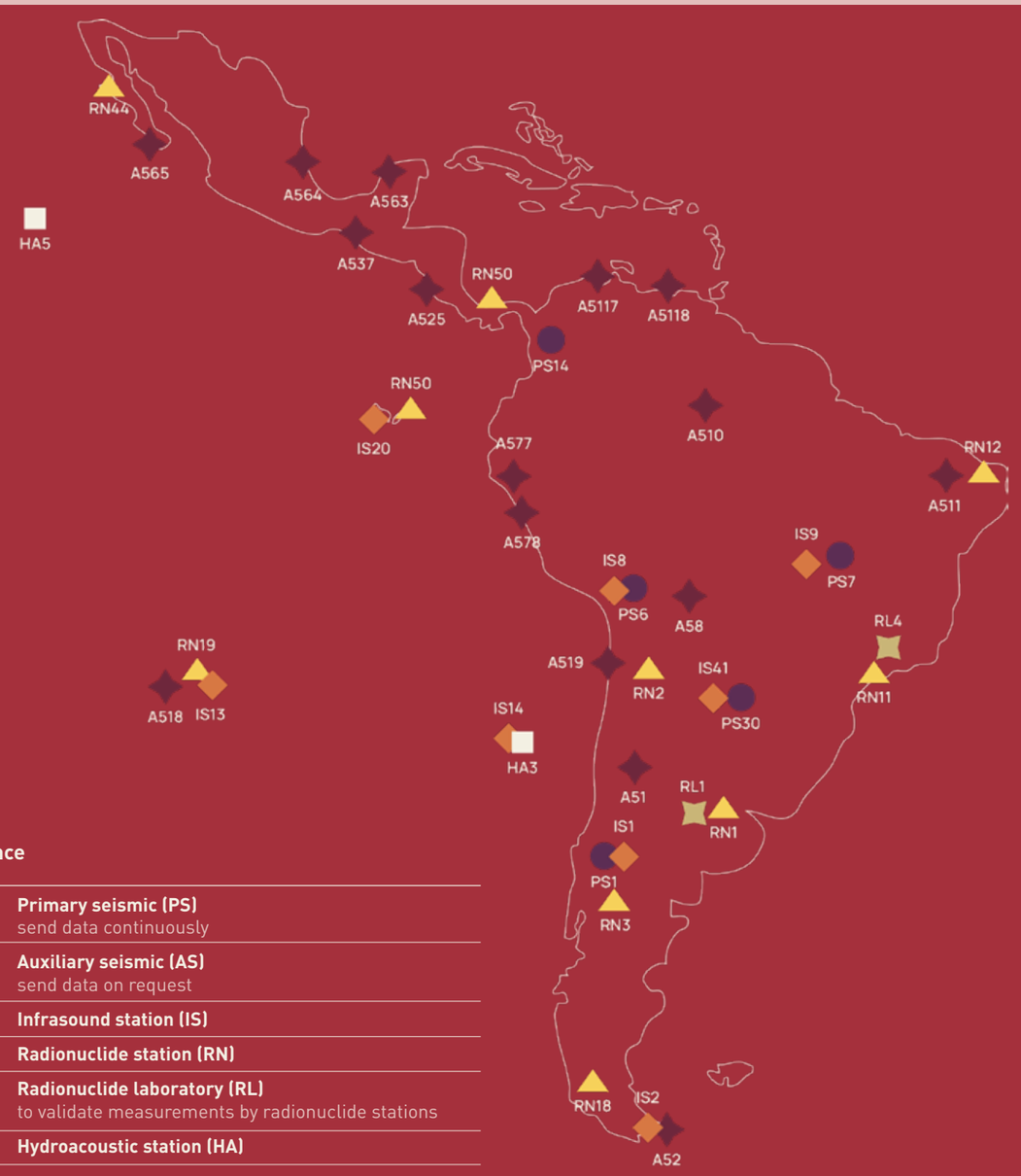
Leveraging the International Monitoring System (IMS) for Global Security

The International Monitoring System (IMS) is a crucial component of the CTBT, with 13 countries in the LAC region hosting 43 monitoring facilities using all four available technologies.

IMS seismic stations monitor vibrations through the ground, hydroacoustic stations detect sound waves in the oceans, infrasound stations listen for ultra-low-frequency sound waves that are inaudible to the human ear, and radionuclide stations monitor the atmosphere for radioactive particles and gases from nuclear explosions.

The locations of these facilities were carefully chosen during the Treaty negotiations, taking into account strategic and scientific considerations, among other factors.

In addition to these monitoring efforts, regional states like Argentina, Chile, Ecuador, Guatemala, Mexico, Panama, Paraguay, and Peru have reached Facility Agreements with the CTBTO. These agreements address political, legal, technological, and operational issues, ensuring the seamless functioning of IMS facilities in the region.



Reference

- **Primary seismic (PS)** send data continuously
- **Auxiliary seismic (AS)** send data on request
- **Infrasound station (IS)**
- **Radionuclide station (RN)**
- **Radionuclide laboratory (RL)** to validate measurements by radionuclide stations
- **Hydroacoustic station (HA)**

Countries 13

Monitoring facilities 43

Primary Seismological Stations 5

City	Coutry
Paso Flores	Argentina
La Paz	Bolivia
Brasilia	Brazil
El Rosal	Colombia
Villa Florida	Paraguay

Auxiliary Seismic Stations 16

Coronel Fontana	Argentina
Ushuaia	Argentina
San Ignacio	Bolivia
Pitinga	Brazil
Riachuelo	Brazil
Easter Island	Chile
Limon Verde	Chile
Las Juntas de Abangares	Costa Rica
El Apazote	Guatemala
Tepich, Quintana Roo	Mexico
Colonia Cuauhtémoc Matias Romero	Mexico
La Paz, Baja California Sur	Mexico
Atahualpa	Peru
Nana	Peru
Santo Domingo	Venezuela
Puerto la Cruz	Venezuela

Radionuclide Laboratories 2

Buenos Aires	Argentina
Rio de Janeiro	Brazil

Radionuclide Stations 10

Buenos Aires	Argentina
Salta	Argentina
Bariloche	Argentina
Rio de Janeiro	Brazil
Recife	Brazil
Punta Arenas	Chile
Hanga Roa, Easter Island	Chile
Isla Santa Cruz, Galápagos Islands	Ecuador
Guerrero Negro, Baja California	Mexico
Panama City	Panama

Hydroacoustic Stations 2

Juan Fernández Island	Chile
Socorro Island	Mexico

Infrasound Stations 8

Pilcaniyeu	Argentina
Ushuaia	Argentina
La Paz	Bolivia
Brasilia	Brazil
Easter Island	Chile
Robinson Crusoe Island	Chile
Isla Santa Cruz, Galápagos Islands	Ecuador
Villa Florida	Paraguay

Civil and Scientific Applications: Beyond Nuclear Test Detection

While the primary purpose of the International Monitoring System is to detect nuclear test explosions, the data collected also provide multiple civil and scientific benefits.

For instance, seismic and hydroacoustic stations within the network monitor underground and oceanic activity around the clock. This information is transmitted in near real-time to National Tsunami Warning Centres (NTWC) of Member States, enabling more timely and accurate public alerts. **This capability has proven invaluable in saving lives and reducing risk, with countries like Chile, Honduras, and Venezuela benefiting from tsunami warning agreements with the CTBTO.**

Additionally, data from CTBTO's seismic monitoring station in Bolivia (PS6) - along with information from the country's national network - has been essential in improving earthquake safety standards. Before 2023, Bolivia relied on international guidelines for earthquake-resistant buildings. Now, with accurate data from PS6, it has created its own standards, based on real seismic activity. This means buildings can be designed to better withstand earthquakes, making them safer and more resilient, ultimately protecting lives and reducing damage in the event of a quake.

Another example is the Argentine submarine ARA San Juan, which disappeared on 15 November 2017 after its last confirmed contact, about 500 kilometres off the coast of San Jorge Gulf. At the request of Argentina, the CTBTO provided data from its IMS. Two hydroacoustic stations - one in the Atlantic and another in the Indian Ocean - had detected unusual signals that appeared to originate near the submarine's last known location.To verify this, the Argentine Navy deployed a depth charge, an explosive device designed to detonate at a specific depth, on 1 December 2017. The explosion created a sound wave that was picked up by the same IMS stations, confirming the area. Nearly a year later, on 17 November 2018, **the ARA San Juan was found at a depth of 900 metres, close to the location identified by the CTBTO.**

CTBTO and Venezuela representatives at tsunami warning agreement signing ceremony, 2024

The illustration shows the approximate last known location of the ARA San Juan (red dot) and the estimated location of the hydroacoustic anomaly (white dot), based on data from the CTBTO's IMS stations. In Panel A, the dashed lines represent the estimated directions of signals detected by hydroacoustic stations HA10 and HA04, which point towards the anomaly. Panel B provides a close-up of the area around the last known location and the estimated anomaly location. [Nielsen, P.L., et al. CTBTO's Data and Analysis Pertaining to the Search for the Missing Argentine Submarine ARA San Juan. Pure Appl. Geophys. 178, (2021)]

Capacity Building: Workshops, Training, and Exercises to Strengthen Regional Expertise

The CTBTO regularly offers capacity building workshops, specialised training, and practical exercises that cover every aspect of the Treaty's verification regime. These initiatives focus on the International Monitoring System (IMS), International Data Centre (IDC), and On-Site Inspection (OSI) capabilities, providing participants with a comprehensive understanding of the tools and techniques used to detect nuclear tests.

Each day, CTBTO's Member States receive around 35 gigabytes of data from the global network of monitoring stations.

Several workshops are designed to equip national experts with the skills necessary to effectively collect, process, and analyse these data.

Alongside data analysis, some training sessions offer hands-on experience with OSI procedures, a key component of the verification regime. **These exercises allow participants to gain practical knowledge in conducting inspections in the event of a suspected nuclear explosion,** ensuring they are ready to contribute when the Treaty enters into force.

In the Latin America and Caribbean region, numerous workshops and sessions have already taken place in countries like Antigua and Barbuda, Argentina, Brazil, Costa Rica, Chile, the Dominican Republic, Guatemala, Jamaica, and Mexico. These initiatives not only strengthen local expertise but also encourage regional cooperation - advancing the shared goal of a nuclear-test-free world.

Key Workshops and Training Initiatives in LAC

2007 2008 2015 2018 2023

2007

OSI Introductory Course, Brazil

36 participants from 15 Member States across the region attended a five-day introductory course in Brasilia, Brazil. This regional outreach programme familiarised participants with the OSI component of the CTBT verification regime.

2008

CTBT National Seminar, Antigua and Barbuda

This one-day seminar, organised in partnership with the Kingdom of the Netherlands, explored the importance of the CTBT, its verification technologies, and the national ratification process.

International Cooperation Workshop, Jamaica

Representatives from 17 Caribbean states gathered in Jamaica to explore the CTBT's civil and scientific benefits. Building on previous efforts, this workshop focused on implementation strategies and enhancing regional cooperation.

2015

NDC Capacity Building Workshop and RSTT Training, Costa Rica

This workshop brought together participants from across the region to strengthen their skills in Regional Seismic Travel Times (RSTT) modelling and data integration.
A highlight of the event was a high-level segment, attended by representatives from both signatory and non-signatory states, which encouraged meaningful dialogue on non-proliferation and disarmament.
The event also placed a special focus on empowering women as catalysts for peace.

2018

OSI Regional Introductory Course, Argentina

A week-long course in Buenos Aires brought together 43 participants from 17 states for hands-on training in on-site inspections.
Experts in geology, seismology, and radiation monitoring gained practical experience in nuclear test verification, expanding the region's specialist pool.

OSI Visual Observation and Radionuclide Techniques Course, Argentina

As part of the 3rd OSI training cycle for surrogate inspectors, this week-long course brought together 14 representatives from 11 Member States, spanning all geographical regions. Participants were familiarised with key observables linked to underground nuclear explosions and explored the critical interplay between visual observation and radionuclide sampling.

2023

NDC Training for Spanish-Speaking Experts, Costa Rica

The CTBTO hosted its first Spanish-language training in Costa Rica, bringing together 29 experts from 15 countries.
This workshop gave participants a deeper understanding of key Treaty concepts, fostered regional cooperation, and encouraged multilingual engagement.

National Data Centre (NDC) team learning about new software, Surinam, 2021

Meeting of GRULAC (Group of Latin America and the Caribbean) Ambassadors with CTBTO, 2024

Ambassador Angela Vigliotta Mella, Permanent Representative of Dominican Republic to UN (Vienna), speaking at GRULAC meeting with CTBTO, 2024

CTBTO and LAC: Other Areas of Cooperation and Leadership

The active participation of Latin America and Caribbean states in the decision-making bodies of the CTBTO underscores the region's deep commitment to a nuclear-test-free world.

In the past, representatives from LAC have served as Chairpersons of the Preparatory Commission, the CTBTO's main decision-making body.

The CTBT also features a unique mechanism to accelerate its entry into force, held every two years. The "Article XIV Conference" serves as a key platform to encourage universal adherence to the Treaty and its implementation.

Since its inception in 1996, LAC countries have played a vital role in co-presiding over the Conference - with Costa Rica, Mexico and Panama among the states contributing to these efforts.

Additionally, the CTBTO employs nearly 300 multidisciplinary professional and support staff from around 90 Member States. Over the years, staff from the Latin America and Caribbean region have held positions at the Director level, the highest in the career structure of the Organization. This includes representatives from countries such as Brazil, Mexico, and others.

"We find it valuable to have capacity building in the region - thanks to CTBTO. We also appreciate the efforts being made towards Spanish interventions and broader multilingualism initiatives."

- The Permanent Representative of the Dominican Republic to the United Nations Office in Vienna, Ambassador Angela Vigliotta Mella, 2024

Article XIV Conference, 2023

Beyond the leadership already established in the region, the younger generation is stepping up to champion a nuclear-test-free world.

Key initiatives like the CTBTO Youth Group (CYG) and the CTBTO Mentoring Programme actively engage participants from LAC countries, equipping them with the knowledge and skills to lead nuclear non-proliferation and disarmament efforts, both regionally and globally.

CTBT Science Diplomacy Symposium, Vienna, 2022

CTBTO Mentoring Programme

This initiative equips early-career women in STEM with the tools to support the mission of banning nuclear testing, promoting a more inclusive approach to global security.

CTBTO Youth Group (CYG)

The CYG provides a unique platform for young people to voice their perspectives in CTBT-related meetings, supporting the goals of UN Security Council Resolution 2250 on Youth, Peace, and Security.

Alinne Olvera Martínez, Mexico, alumna of CTBTO Mentoring Programme at Science Diplomacy Symposium, 2022

"The future of scientific progress and global peace lies in the hands of the next generation. By providing mentorship and guidance, we can inspire and equip our youth with the tools they need to make significant contributions to the scientific community."

- CTBTO Mentoring Programme alumna, Alinne Olvera Martínez (Mexico)

CTBTO Research Fellowship Programme

The CTBTO Research Fellowship Programme offers young researchers hands-on experience with the technical aspects of nuclear test-ban verification, helping to build future expertise in the field. Since its launch in 2021, numerous fellows from the LAC region have participated in this initiative.

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2024

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