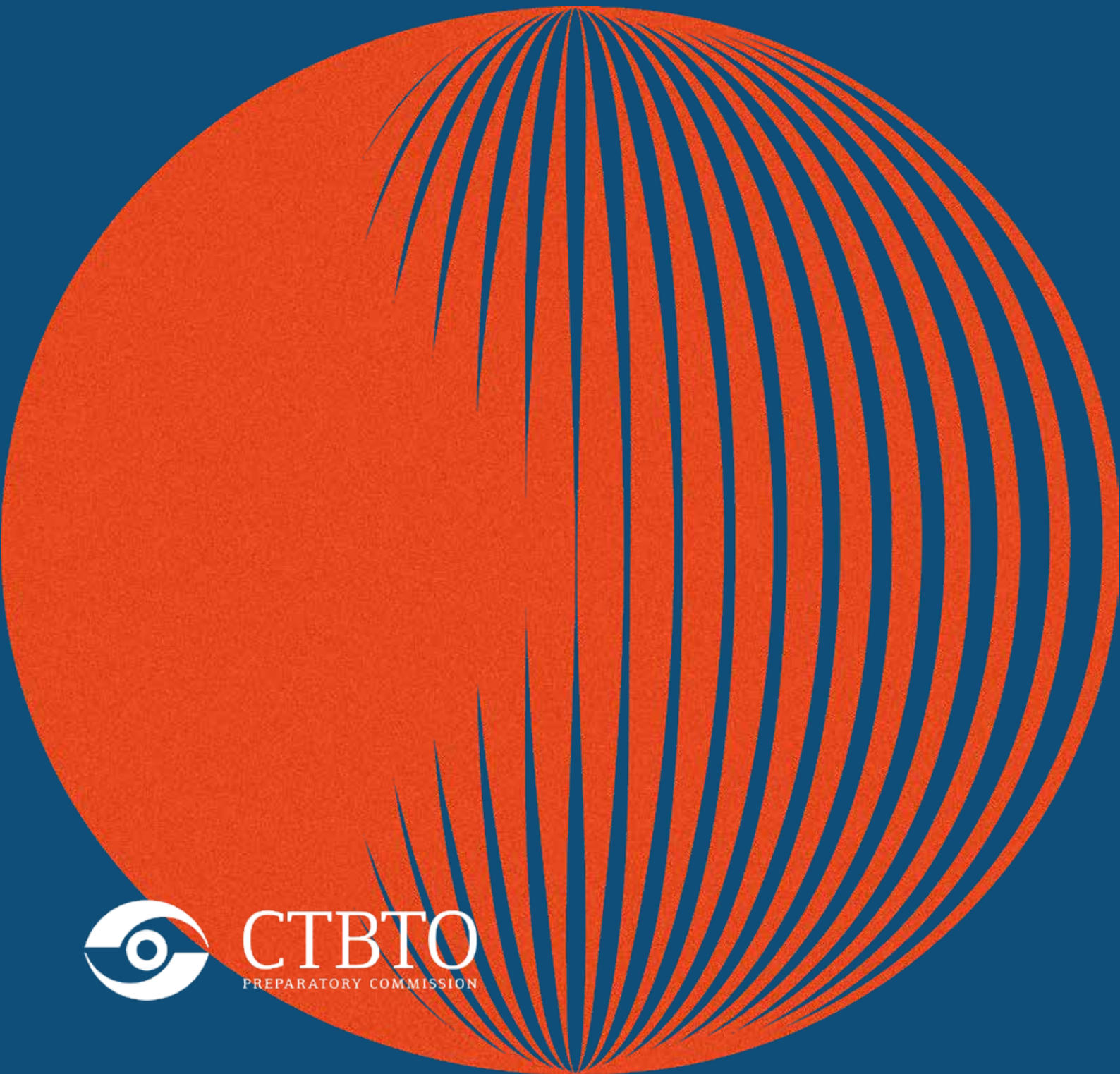
South-East Asia, Pacific, and Far East

Regional Resolve, Global Impact:

CTBTO and SEAPFE's Partnership



CTBTO
PREPARATORY COMMISSION

At the Forefront of Nuclear Non-Proliferation and Disarmament

Peace memorial park in Hiroshima, Japan

The South-East Asia, Pacific, and Far East (SEAPFE) is the only region in which nuclear weapons have been used in an armed conflict and continues to face the lasting impact of nuclear weapons testing.

Perhaps in part due to this, SEAPFE countries have become leaders in nuclear non-proliferation and disarmament, actively participating in key treaties and groups committed to these efforts.

Civil society in the region is very active on this front. The 2024 Nobel Peace Prize was awarded to Nihon Hidankyo, a grassroots movement formed by the "hibakusha", survivors of Hiroshima and Nagasaki, "for its efforts to achieve a world free of nuclear weapons and for demonstrating through witness testimony that nuclear weapons must never be used again."

Lanterns at peace memorial ceremony, Hiroshima, Japan, 2023

SEAPFE and the Comprehensive Nuclear-Test-Ban Treaty (CTBT)

Only a few countries in the region have yet to sign and ratify the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Seven of these states are listed in Annex 2 of the Treaty, meaning they possessed nuclear power or research reactors at the time of negotiations, and their ratifications are required for the CTBT to enter into force.

Of these seven, five - Australia, Indonesia, Japan, the Republic of Korea, and Viet Nam - have already signed and ratified the Treaty.

Globally, there are 44 Annex 2 States.

SEAPFE and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is a landmark agreement aimed at preventing the spread of nuclear weapons and related technologies.

The NPT and the CTBT are inextricably interlinked - in its preamble, the NPT recalls states' commitment "to achieve discontinuance of all test explosions of nuclear weapons for all time."

SEAPFE countries are strong supporters of these goals within this broader architecture.

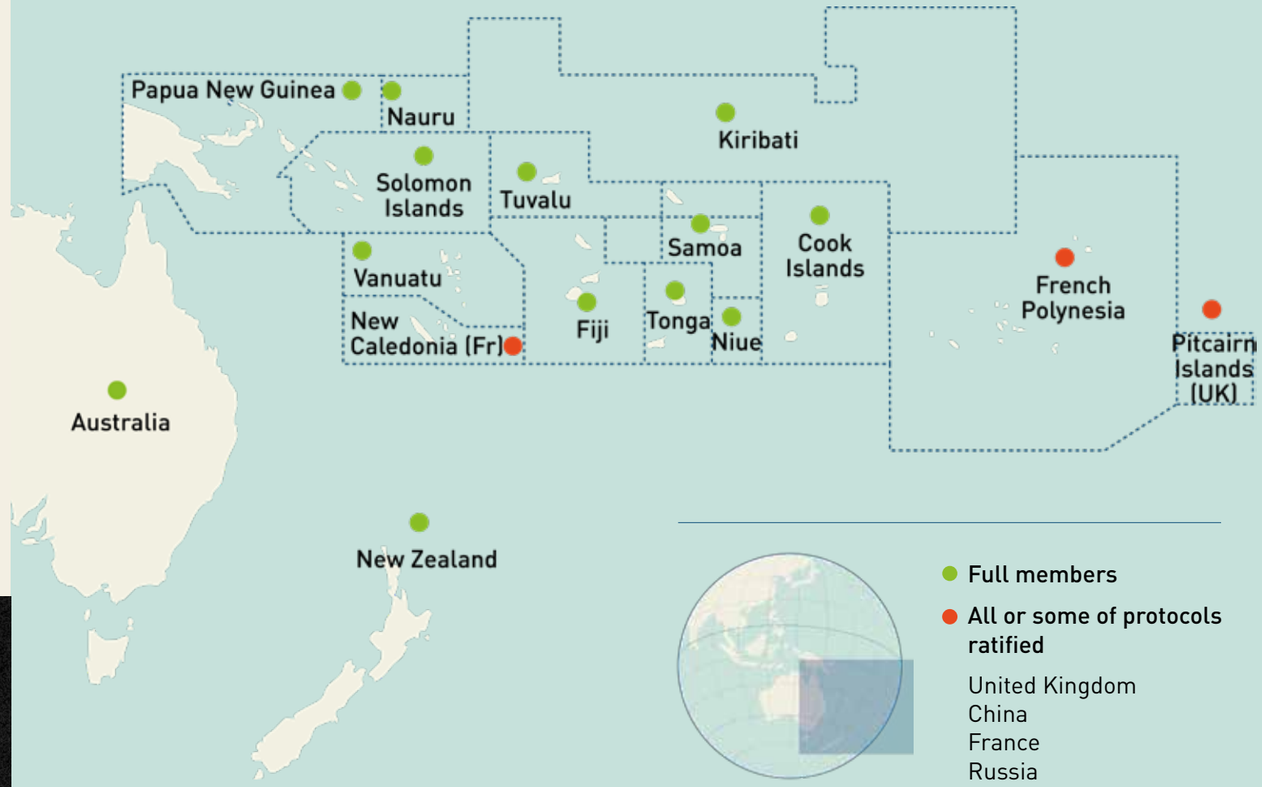
Of the 32 states in the region, 29 have either ratified or acceded to the NPT. While the Cook Islands and Niue are not formal parties, they follow the NPT's provisions through New Zealand's ratification on their behalf.

The only SEAPFE country not party to the NPT is North Korea.

Philippine Ambassador Libran Nuevas Cabactulan (centre), President of 2010 Review Conference for the Nuclear Non-Proliferation Treaty (NPT)

Malaysian Ambassador Syed Mohamad Hasrin Aidid, Chair of 2019 NPT Preparatory Committee

A Stand for Peace: The South Pacific Nuclear Free Zone Treaty



The Treaty of Rarotonga, also known as the South Pacific Nuclear Free Zone Treaty, entered into force in 1986. It was established in response to the South Pacific's direct experience with nuclear weapons testing, creating the world's second nuclear-weapon-free zone (NWFZ) in a populated region - following the Treaty of Tlatelolco in Latin America and the Caribbean.

The Treaty of Rarotonga's commitment to preventing nuclear testing closely aligns with the mission of the CTBTO.

The Treaty of Rarotonga covers a wide area, and its Member States include Australia, the Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu, and Vanuatu.

Southeast Asia's Nuclear-Weapon-Free Zone: The Bangkok Treaty

The Treaty on the Southeast Asia Nuclear Weapon-Free Zone, also known as the SEANWFZ Treaty or Bangkok Treaty, entered into force in 1997. This treaty is a critical legal instrument supporting the goal of the Association of Southeast Asian Nations (ASEAN) to maintain Southeast Asia as a nuclear-weapon-free zone - with no weapons of mass destruction.

It also reinforces the crucial role of the NPT in curbing the spread of nuclear weapons and supporting international peace and security.

The Bangkok Treaty requires its parties to refrain from developing, manufacturing, acquiring, possessing or having control over nuclear weapons, as well as stationing, transporting, and, importantly, testing nuclear weapons - a prohibition that directly supports CTBTO's purpose.

Its Member States are Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam.

● Southeast Asia Nuclear Weapon-Free Zone

A Model for Peace: Mongolia's Nuclear-Free Status

Mongolia has gained international recognition as the only country in the world with a nuclear-weapon-free status.

After Mongolia declared itself as nuclear-weapon-free in 1992, representatives from the country and, critically, the five nuclear-weapon-states - the United States, Russia, China, France, and the United Kingdom - signed parallel declarations at the United Nations in 2012, formally acknowledging Mongolia's nuclear-weapon-free status. In this context, these countries reaffirmed their commitments, originally made in 2000, to refrain from using nuclear weapons against Mongolia and pledged to uphold its nuclear-free status.

Mongolia has declared full compliance with its NPT commitments, supported by national laws that ban nuclear weapons activities such as development, acquisition, stationing, transportation, and testing - an area central to CTBTO's goal.

Radionuclide station (RN45), Ulaanbaatar, Mongolia

Aerial view of primary seismic station (PS25), Songino, Mongolia

The Role of the IMS in SEAPFE

The International Monitoring System (IMS) plays a vital role in the CTBT, serving as a global network that detects nuclear test explosions anytime, anywhere. The South-East Asia, Pacific, and Far East region is key to these efforts, hosting 78 monitoring stations and four laboratories.

IMS sites were carefully chosen during Treaty negotiations and set out in Annex 1 to the Protocol of the CTBT, based on scientific criteria, with each type of technology playing a unique role in detecting signs of nuclear testing.

• **Seismic:** One of the three waveform technologies, seismic monitoring detects and locates underground nuclear explosions.

• **Hydroacoustic:** This technology records pressure changes caused by sound waves in water, allowing for detection of underwater events.

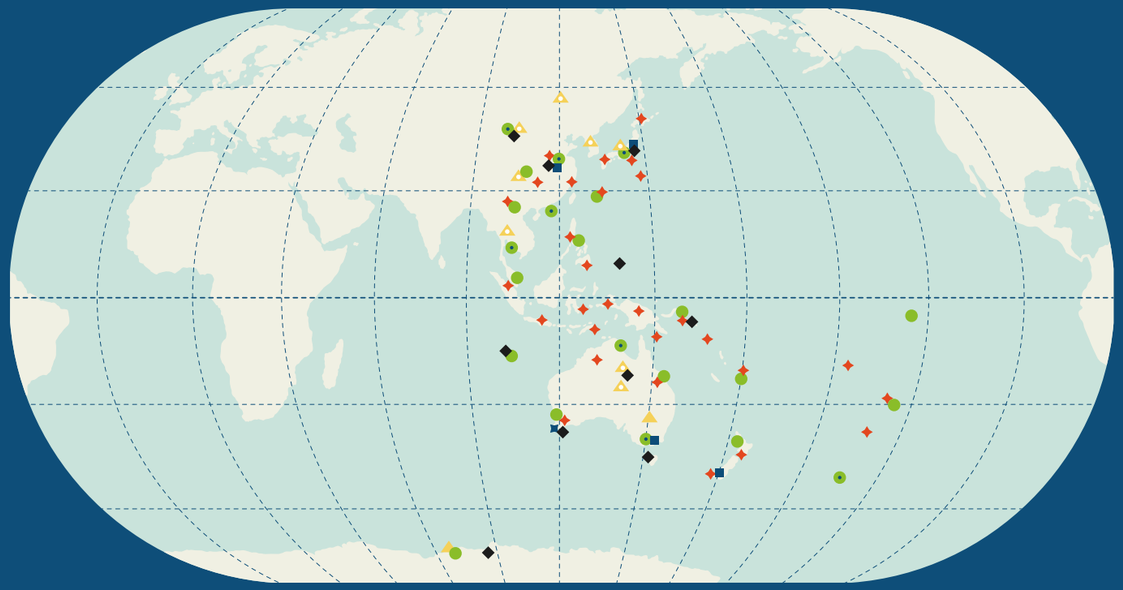
• **Infrasound:** Infrasound detects and locates ultra-low-frequency sound waves, inaudible to the human ear, generated by atmospheric nuclear explosions.

• **Radionuclide:** The only technology that can confirm whether an explosion detected and located by the others is indicative of a nuclear test.

This one-of-a-kind network of facilities has consistently proven its effectiveness, quickly detecting each of North Korea's six declared nuclear tests between 2006 and 2017. In each instance, data from the IMS's seismic, hydroacoustic, and infrasound stations were used to determine, with precision, the time, location, and magnitude of the events, highlighting the network's critical role in global safety and security.

Collaboration with Regional Partners

The smooth operation of the IMS in the SEAPFE region relies on strong partnerships and formal agreements. Countries such as Australia, the Cook Islands, Indonesia, Mongolia, New Zealand, Palau, and Philippines have signed Facility Agreements with the CTBTO. These agreements cover political, legal, technological, and operational aspects, ensuring that the network functions effectively and securely within each host country.



Reference

- Seismic Primary Array (PS)
- Seismic Primary 3-Component Station (PS)
- Seismic Auxiliary Array (AS)
- Seismic Auxiliary 3-Component Station (AS)
- Radionuclide Station (RN)
- Radionuclide Station with Noble Gas Monitoring Capabilities (RN)
- Radionuclide Laboratory (RL)
- Hydroacoustic (Hydrophone) Station (HA)
- Hydroacoustic (T-Phase) Station (HA)
- Infrasound Station (IS)

Primary Seismological Stations 10

City	Country
Warramunga, NT	Australia
Alice Springs, NT	Australia
Stephens Creek, NSW	Australia
Mawson, Antarctica	Australia
Hailar	China
Lanzhou	China
Matsushiro	Japan
Songino	Mongolia
Wonju	Republic of Korea
Chiang Mai	Thailand

Auxiliary Seismological Stations 29

Charters Towers, QLD	Australia
Fitzroy Crossing, WA	Australia
Narrogin, WA	Australia
Baijiatuan	China
Kunming	China
Sheshan	China
Xi'an	China
Rarotonga	Cook Islands
Monasavu, Viti Levu	Fiji
Lembang, Jawa Barat	Indonesia
Jayapura, Irian Jaya	Indonesia
Sorong, Irian Jaya	Indonesia
Parapat, Sumatera	Indonesia
Kappang, Sulawesi Selatan	Indonesia
Baumata Timur	Indonesia
Ohita, Kyushu	Japan
Kunigami, Okinawa	Japan
Hachijojima, Izu Islands	Japan
Kamikawa-asahi, Hokkaido	Japan
Chichijima, Ogasawara	Japan
Rata Peaks, South Island	New Zealand
Raoul Island	New Zealand
Urewera, North Island	New Zealand
Port Moresby	Papua New Guinea
Keravat	Papua New Guinea
Davao, Mindanao	Philippines
Tagaytay, Luzon	Philippines
Afiamalu	Samoa
Honiara, Guadalcanal	Solomon Islands

Radionuclide Stations 22

Melbourne, VIC	Australia
Mawson, Antarctica	Australia
Townsville, QLD	Australia
Macquarie Island	Australia
Cocos Islands	Australia
Darwin, NT	Australia
Perth, WA	Australia
Beijing	China
Lanzhou	China
Guangzhou	China
Rarotonga	Cook Islands
Nadi	Fiji
Okinawa	Japan
Takasaki, Gunma	Japan
Kiritimati	Kiribati
Tanah Rata	Malaysia
Ulaanbaatar	Mongolia
Chatham Island	New Zealand
Kaitaia	New Zealand
Kavieng, New Ireland	Papua New Guinea
Tanay	Philippines
Bangkok	Thailand

Radionuclide Laboratories 4

Melbourne, VIC	Australia
Beijing	China
Tokai, Ibaraki	Japan
Christchurch	New Zealand

Hydroacoustic Stations 1

Cape Leeuwin, WA	Australia

Infrasound Stations 12

Davis Base, Antarctica	Australia
Shannon	Australia
Hobart, TAS	Australia
Cocos Islands	Australia
Warramunga, NT	Australia
Beijing	China
Kunming	China
Isumi	Japan
Songino	Mongolia
Chatham Island	New Zealand
Palau	Palau
Keravat	Papua New Guinea

Beyond Nuclear Testing: From Disaster Preparedness to Marine Research

The CTBTO's state-of-the-art IMS, designed to detect nuclear test explosions, has also become a valuable resource for civil and scientific applications. Data from this network can support research on climate change, disaster resilience, and risk management, directly contributing to the UN Sustainable Development Goals (SDGs).

"Besides [its] importance in disaster mitigation, the data received by the CTBTO from its global network of monitoring stations can advance research on ocean processes and marine life and contribute to sustainable development."

- UNESCO's former Director-General, Irina Bokova

Supporting Tsunami Early Warning Systems

Through a partnership with the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the CTBTO shares critical data to support tsunami early warning systems.

When this collaboration launched in 2010, UNESCO's then-Director-General, Irina Bokova, highlighted its broader significance.

Countries in the region, including Australia, Indonesia, Japan, the Republic of Korea, Malaysia, Myanmar, Philippines, and Thailand, have tsunami warning agreements with the CTBTO.

Rapid Response to Japan's 2011 Earthquake and Tsunami

Following Japan's magnitude 9.0 earthquake and devastating tsunami in 2011, CTBTO's network played a crucial role in emergency efforts. Data from around 20 seismic and hydroacoustic stations were shared in near real-time with tsunami warning centres, including those in Japan and Hawaii, under agreements with the Organization. This enabled national authorities to issue rapid alerts to Japan's neighbouring countries and the broader Pacific region.

Monitoring Radiation After Fukushima

After the Fukushima Daiichi nuclear power accident, the CTBTO shared data with Member States from its radionuclide stations on the spread of radioactive emissions. In Philippines, for example, this information assisted the country's national radiological protection agency - providing advice to the Philippine Nuclear Research Institute.

Discovering a New Whale Population

In 2021, CTBTO hydroacoustic data was used to help researchers solve the mystery of the "Chagos song," a unique whale call heard in the Indian Ocean. Under a vDEC research contract, scientists at the University of New South Wales analysed nearly two decades of recordings and identified a new population of pygmy blue whales. This discovery supports whale conservation and marine ecosystem protection.

Tracking the Hunga Tonga-Hunga Ha'apai Eruption

When the Hunga Tonga-Hunga Ha'apai volcano erupted with unprecedented force in 2022, the CTBTO's infrasound stations captured the event in remarkable detail. Sound waves from the eruption travelled around the globe several times, with all IMS infrasound stations collecting extensive data before, during, and after the eruption. This comprehensive monitoring showcased the CTBTO's ability to track major natural events, demonstrating the network's impressive reach and precision in disaster monitoring.

Investing in Regional Talent: CTBTO's Capacity Building, Training and Exercises

The CTBTO has been actively building capacity and promoting regional cooperation across the South-East Asia, Pacific, and Far East region through specialised workshops, technical meetings, and training sessions.

Some of these initiatives offer detailed insights into the CTBT's verification regime, covering the International Monitoring System (IMS), International Data Centre (IDC), and On-Site Inspection (OSI) capabilities. This work strengthens local expertise, enhances national capacities, and fosters collaboration towards the shared goal of a nuclear-test-free world.

2014

Regional Conference on the CTBT - Indonesia, 2014

This conference advanced CTBTO efforts, while strengthening regional capacity. Opened by then-Foreign Minister Marty Natalegawa, the event also showcased civil and scientific applications of CTBT data, including early tsunami warning systems.

CTBTO Regional Conference for States, Jakarta, Indonesia, 2014

2018

East Asia Regional National Data Centre (NDC) Workshop - Mongolia, 2018

This workshop brought together over 30 participants to explore how NDCs are using IMS data and IDC products. It also aimed to promote collaboration within the region by encouraging NDCs to conduct a joint exercise analysing waveform and radionuclide data.

Expert Meetings on Special Studies and Expert Technical Analysis with Waveform Methods and RN and ATM Methods - Republic of Korea, 2023

Over 80 experts from 40 countries gathered at this international meeting to discuss and improve methods for detecting nuclear tests – using waveform methods and Atmospheric Transport Modelling.

East Asia Regional NDC Workshop - Indonesia, 2023

This workshop gathered participants to strengthen expertise, share best practices, and discuss applying verification data for national capacity building.

2023

National Data Centre (NDC) Workshop - China, 2024

This workshop brought together some 90 participants from 59 Member States, including, for the first time, representatives from countries without an NDC. It provided a valuable platform for technical experts to share insights and knowledge on accessing IMS data, using IDC products and operating an NDC.


Participants of National Data Centre (NDC) Workshop, Beijing, China, 2024

2024

On-Site Inspection (OSI) in SEAPFE

On-Site Inspection (OSI) is the final component of the CTBT verification regime. Once the Treaty enters into force, Member States can request an inspection to gather additional on-the-ground evidence if the global monitoring system detects a potential nuclear test explosion. An OSI not only establishes whether a nuclear explosion has occurred but can also help identify those responsible for any Treaty violation. It is the ultimate verification measure under the CTBT.

In Southeast Asia, the Pacific, and Far East region, targeted OSI-related activities have been developed and implemented to build a robust foundation of regional expertise. These include:

OSI Regional Introductory Courses

Thailand, 2023 and Republic of Korea, 2008

These courses gave participants an introduction to OSI methodologies, bringing together experts from SEAPFE to build foundational knowledge and hands-on experience with inspection techniques. Through these efforts, potential candidates were identified for the CTBTO's OSI roster of surrogate inspectors.

Surrogate Inspector Training Activities

Surrogate inspector training aims to equip selected experts with the specialised skills needed for effective OSI implementation. Participants build proficiency in applying their expertise within the unique framework of an OSI, preparing them to undertake inspections in real-world situations.

Radionuclide Noble Gas Training Course - China, 2013

In radionuclide analysis, specialised knowledge is essential for detecting nuclear test signatures. This training course offered noble gas experts detailed guidance on detecting and interpreting relevant radionuclide signals - a key component of CTBT verification.

Table-Top Exercise on Visual Observation, Republic of Korea, 2010

Visual observation is an essential skill for surrogate inspectors, boosting their ability to spot and document critical evidence during inspections. This exercise, designed for inspectors with various technical backgrounds, honed their observational skills and prepared them for real-world scenarios.

Through these and other training activities held around the world, SEAPFE now has over 30 experts from approximately 10 countries rostered as surrogate inspectors following rigorous training.

OSI Workshops

OSI workshops play a vital role in strengthening the OSI component of the CTBT verification regime by focusing on specific, practical topics. Regional workshops have been held in locations such as China (2001 and 2013), Japan (2003), and Australia (2005) - covering critical areas like OSI methodologies, essential equipment, operational protocols, technical procedures, and preparations for large-scale activities.

Each of these workshops in the region contributed valuable insights and practical skills to strengthen OSI capabilities.

Mentee Litanya Octonovrilna participating in field exercise during CTBT Science Diplomacy Symposium, Vienna, Austria, 2022

Empowering the NextGen to Uphold a Global Promise

Beyond collaborations at a political and technical level, SEAPFE's next generation has shown a strong commitment to CTBTO's mission, participating in the CTBTO Youth Group (CYG), the Mentoring Programme, and the Research Fellowship.

These platforms empower young people to contribute to the global effort to end nuclear weapons testing. They offer opportunities to learn about the Organization's work, advocate for the Treaty, and develop skills in science, technology, engineering and mathematics (STEM) fields - all contributing to a nuclear-test-free world for future generations.

Mentee Shanhong Li of China (left) participating in CTBT Science Diplomacy Symposium, Vienna, Austria, 2022

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Public Information Section of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO)

Vienna International Centre, P.O. Box 1200, 1400 Vienna, Austria | info@ctbto.org | WWW.CTBTO.ORG