

# SnT 2023

CTBT: SCIENCE AND TECHNOLOGY CONFERENCE



**19 TO 23 JUNE**

**HOFBURG PALACE, VIENNA & ONLINE**

## CONFERENCE OBJECTIVES

- 1 Identify opportunities and methods to improve nuclear-test-ban monitoring and on-site inspection;
- 2 Demonstrate how scientific developments and cooperation can support national needs, frame policy objectives in support of the CTBT and promote its universalization;
- 3 Broaden, connect and strengthen the scientific communities working in nuclear-test-ban monitoring and on-site inspection, including young scientists, and to enhance the geographical and gender representations of these communities;
- 4 Promote civil and scientific applications, capacity building and training related to CTBT techniques and data.

## INVITATION

The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) relies on innovation to enhance the capabilities of the Treaty's verification regime as well as to help move the Treaty closer to universalization and entry into force. As the seventh event in the CTBT: Science and Technology conference series, **SnT2023** will bring together well over 1000 scientists, technologists, academics, students and representatives of the CTBTO's policy making organs. In addition, representatives from the fields of research and development, science diplomacy, science advisory, media and advocacy are invited to attend the conference.

**SnT2023** is scheduled to take place at the Hofburg Palace in Vienna, Austria, featuring virtual components for active online participation to support broader outreach and global inclusiveness. While restrictions on physical attendance at **SnT2023** due to COVID-19 are not currently foreseen, the structure of the conference will be hybrid and will remain flexible in order to adapt to any circumstances as needed.

## CALL FOR ABSTRACTS

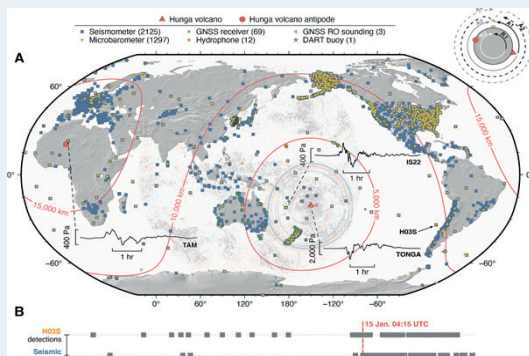
Deadline for submission of abstracts:  
30 NOVEMBER 2022 at 23:59 UTC

CTBTO.ORG/SnT2023  
#SnT2023



# THEME 1

# THE EARTH AS A COMPLEX SYSTEM



Global distribution of recording geophysical sensors and remotely observed eruption chronology of the Hunga Tonga Hunga Ha'apai eruption of 15 January 2022 at 04:15 UTC with (A) Sensor map and Hunga Tonga Hunga Ha'apai eruption wave path and (B) Hunga Tonga Hunga Ha'apai activity from December 2021 through January 2022 observed at International Monitoring System hydrophone, seismic, and infrasound stations from the Reviewed Event Bulletin. Matoza et al., Science (2022). [www.science.org/doi/epdf/10.1126/science.abo7063](https://www.science.org/doi/epdf/10.1126/science.abo7063)

## TOPICS

### T1.1 The Atmosphere and its Dynamics

Infrasound wave propagation and attenuation, transport of radionuclides, global circulation, volcanoes, climatology, meteorology, noise sources

### T1.2 The Solid Earth and its Structure

Seismicity, earthquake observatories, seismic and acoustic wave speed and attenuation, tectonics, locating seismic disturbances, subsurface properties, pathways for radionuclides

### T1.3 The Oceans and their Properties

Oceanography, hydroacoustics, ocean observatories, long range propagation, refraction and diffraction, 2-D and 3-D models, T phase modelling, acoustic coverage, ocean acoustic tomography and thermometry, undersea volcanoes, undersea earthquakes, tsunamigenic events, soundscapes, marine mammals

### T1.4 Multidisciplinary Studies of the Earth's Subsystems

Data analysis, modelling, physics, waveform data fusion, phase conversion, coupling across interfaces, 2022 Hunga Tonga Hunga Ha'apai eruption, interference between anthropogenic aspects and the earth's system processes

## KEYWORDS

KEYWORDS INDICATE WHAT MIGHT FIT UNDER THE TOPIC, INCLUDING PRIORITIES. POSSIBLE SUBMISSIONS ARE NOT LIMITED TO THE KEYWORDS.

## THE VERIFICATION REGIME

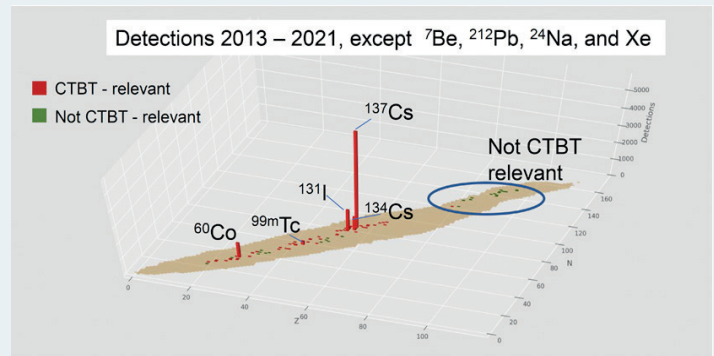


The International Monitoring System consists of 337 facilities worldwide which monitor the planet for signs of nuclear explosions. Over 90% of the facilities are already in operation and the International Data Centre in Vienna continuously processes this data stream. Both International Monitoring System data and International Data Centre

products are made available to all 186 States Signatories of the CTBT. The processing and analysis of data from different sources must ultimately present an integrated picture in order to allow decision makers to determine whether an on-site inspection should be conducted and clarify if there has been a Treaty violation.

# THEME 2 EVENTS AND NUCLEAR TEST SITES

Detection of radionuclides, 2013–2021.  
CTBT-relevant isotopes are shown in red; those  
that are not relevant are shown in green.  
<https://conferences.ctbto.org/event/7/contributions/1378/>



## TOPICS

**T2.1** Characterization of Treaty-Relevant Events

**T2.2** Challenges of On-Site Inspection

**T2.3** Seismoacoustic Sources in Theory and Practice

**T2.4** Atmospheric and Subsurface Radionuclide Background and Dispersion

**T2.5** Historical Data from Nuclear Test Monitoring

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Democratic People's Republic of Korea announced tests, detection, understand the full extent of signals that may be generated by a nuclear explosion, location in time and space, analysis, characterization of the source, discrimination, screening criteria, differentiate nuclear tests from other human-made or natural events

Observables that may be expected after a nuclear test, how these could be identified as geophysical, radioactive, temperature or other anomalies or artifacts of testing, surface and subsurface features, site and event characterization including experience from the past, identify and distinguish observables generated by historic and recent tests

Earthquakes, explosions, signals being emitted, anomalies, signals that could be confused with those from a nuclear explosion

Natural and human-made sources of radioisotopes, release of radionuclides, atmospheric transport modelling, anomalies of atmospheric radioactivity, isotopic ratios that could be confused with those from a nuclear explosion, radionuclide migration

Historical records, digitizing, archive preservation, discrimination, metadata, event bulletin, lessons learned for current monitoring and future on-site inspection, data for training and exercises

## ABOUT THE TREATY



The CTBT opened for signature in 1996. It bans all nuclear explosions, everywhere and by everyone. Before the CTBT can enter into force, all of the 44 countries listed in Annex 2 of the Treaty must ratify it. These countries possessed nuclear power or nuclear research reactors when the CTBT was negotiated. Eight of

the Annex 2 States have not yet ratified: China, the Democratic People's Republic of Korea, Egypt, India, the Islamic Republic of Iran, Israel, Pakistan and the United States of America. Three of the Annex 2 States have not yet signed the Treaty: the Democratic People's Republic of Korea, India and Pakistan.



# THEME 3 MONITORING AND ON-SITE INSPECTION TECHNOLOGIES AND TECHNIQUES



Diver inspecting the undersea cable at hydroacoustic station HA4, at one of the world's most challenging ocean locations.

## TOPICS

**T3.1** Seismic, Hydroacoustic and Infrasound Technologies and Applications

**T3.2** Radionuclide Technologies and Applications

**T3.3** On-Site Inspection Techniques

**T3.4** Integrating Data from Different Monitoring Technologies

**T3.5** Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data

**T3.6** Analysis of Radionuclide Monitoring Data

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Forwarding of continuous and segmented data, data assimilation, design of sensor systems, advanced sensor, novel technologies

Sampling and sample processing, data acquisition, particulate sample systems, gamma-gamma coincidence counting, new generation noble gas systems, radionuclide laboratories

Visual observations, remote sensing including multispectral, satellite imagery, unmanned measurement platforms, measurements of radioactivity and energy resolution analysis, environmental sampling and analysis in mobile and field based facilities, seismic and non-seismic geophysical techniques, drilling equipment

Fusion of data, large data analysis including supplementary data like wind fields, other data to supplement International Monitoring System data for expert technical analysis, diverse sources of remotely sensed data, augmented reality

Signal processing, data analysis algorithms, reduction of analyst workload, artificial intelligence, bulletin quality, new approaches, adaptation and integration of methods used in other fields

Spectrum calibration and analysis algorithms, enhance quality of automated processing, reduction of analyst workload, artificial intelligence, estimation of radionuclide concentrations from known sources, improvement of event screening, Nuclear Explosion Signal Screening Open Intercomparison Exercise

## INVITATION TO ACCESS IMS DATA



The virtual Data Exploitation Centre provides scientists with access to International Monitoring System data to conduct research and to publish new findings. The strong relationship between the scientific and technological communities and the CTBTO helps to ensure that the International Monitoring System remains at the forefront of technological innovation

and that no nuclear explosion goes undetected. Conference participants are encouraged to make use of the virtual Data Exploitation Centre to carry out scientific studies and assessments and to present their findings at **SnT2023**. Requests for access to the virtual Data Exploitation Centre can easily be completed and submitted online at [ctbto.org/specials/vdec](https://ctbto.org/specials/vdec).

# SUSTAINMENT OF NETWORKS, PERFORMANCE EVALUATION AND OPTIMIZATION



Airborne simulator in front of the Technology Support and Training (TeST) Centre in Seibersdorf, Austria.

## TOPICS

- T4.1** Performance Evaluation of the International Monitoring System and On-Site Inspection and their Components

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- T4.2** Systems Engineering for International Monitoring System and On-Site Inspection

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- T4.3** Enabling IT Technologies

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- T4.4** International Monitoring System Sustainment

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- T4.5** On-Site Inspection Team Functionality

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## KEYWORDS

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Performance metrics, network coverage, data availability, quality and timeliness, resilience, lessons learned from the COVID-19 pandemic, preparedness exercises, feedback on International Data Centre products and services, lessons learned from on-site inspection build-up and field exercises, national operations and procedures

Power systems, system refurbishment and modernization, communication infrastructure, sensor network design and operation

Data protection, cyber security for Treaty monitoring and on-site inspection, accessibility of data, Internet of Things, authentication of samples, simulation, computational models

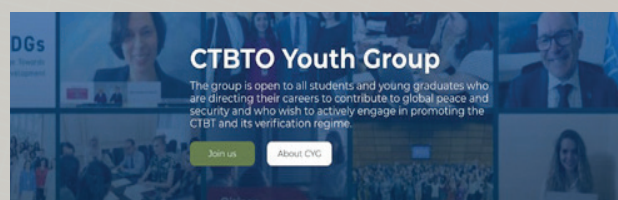
Stations, laboratories, global communications infrastructure, repair, predictive and preventative maintenance, life cycle, causes of failure, state of health parameters, recapitalization, improvements to efficiency and cost effectiveness, reliability and security

Methodology, concept for operations and building capacities, health and safety of inspectors, training, tabletop and build-up exercises, equipment maintenance, sustainment of OSI readiness

## FINANCIAL SUPPORT

Financial support may be available to a limited number of participants. Such assistance must be requested at the time of registration and abstract submission, and must be submitted as early as possible and **no later than 30 November 2022**.

Financial support will be considered only for participants who have submitted an abstract that is approved by the Scientific Programme Group. Participants are strongly encouraged to first seek travel and participation funds from non-CTBTO sources. If you do not find the answer to your questions on the [www.ctbto.org/SnT2023](http://www.ctbto.org/SnT2023) pages, please email [SnT@ctbto.org](mailto:SnT@ctbto.org).



The CTBTO Youth Group is open to all students and young professionals who are directing their careers towards global peace and security, and who wish to actively promote the CTBT and its verification regime. Members share the common goal of achieving the entry into force of the CTBT. For more details, email [youthgroup@ctbto.org](mailto:youthgroup@ctbto.org) or visit [youthgroup.ctbto.org](http://youthgroup.ctbto.org).



# THEME 5 CTBT IN A GLOBAL CONTEXT

Science and Technology 2021 Conference  
Opening Event, Vienna, Hofburg Palace,  
28 June 2021



## TOPICS

## KEYWORDS

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### T5.1 CTBT Science and Technology Policy

Supporting countries' position on CTBT, role of SnT towards entry into force of the CTBT, and lessons learned from/to other arms control agreements and arrangements, multilateralism, broader context of international organizations, reinforcing confidence building, role of National Data Centres, evidence based policy making, expert advice to national authorities, science-policy interface, innovative solutions within the framework of the CTBT

### T5.2 Synergies with Global Challenges

Civil and scientific applications of International Monitoring System data, natural hazards, disaster risk reduction, tsunami early warning, climate change studies, sustainable development goals, nuclear and radiological emergencies, international collaboration, CTBTO virtual Data Exploitation Centre

### T5.3 Regional Empowerment

Capacity building and training, technical assistance, regional networking, cooperation among National Data Centres, multilingualism

### T5.4 Outreach

Treaty advocacy, education, science communication, public information, raising awareness and understanding, outreach initiatives, human resources development, CTBTO Youth Group, next generation of experts, diversity and gender equality

## REGISTRATION AND SUBMISSION OF ABSTRACTS

Online registration and abstract submission is accessible through [www.ctbto.org/SnT2023](http://www.ctbto.org/SnT2023) with a submission deadline of **30 November 2022 at 23:59 UTC**. No registration fee will be charged. The working language of the conference is English.

Authors are asked to choose the appropriate theme and topic when submitting the abstract (maximum 200 words) of their presentation. Authors can select their preferred format as an oral or a poster presentation. However, it is possible that some contributions submitted as oral may be assigned as posters by the organizers. Authors are asked for a non-binding preference between on-site and online participation. In addition, authors are required to submit a short and simple description (maximum 280 characters) outlining the abstract's

main contribution to the **SnT2023** objectives. The selection of abstracts will be based on quality and relevance to the themes and topics of the conference.

The Scientific Programme Group may reassign an abstract to an alternative topic in order to maintain a coherent scientific programme. By submitting an abstract, authors agree to the publication of their abstract and presentation material by the CTBTO. Accepted abstracts will be made available on the SnT website and SnT mobile app in addition to being compiled into a Book of Abstracts. Short descriptions may be used to advertise presentations during the event and in the final conference report. A peer reviewed collection of publications will be produced from a selection of all abstracts submitted.