**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
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

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

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.
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.
### TOPICS

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<th>Theme</th>
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<td>Seismic, Hydroacoustic and Infrasound Technologies and Applications</td>
<td>Forwarding of continuous and segmented data, data assimilation, design of sensor systems, advanced sensor, novel technologies</td>
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<td>Radionuclide Technologies and Applications</td>
<td>Sampling and sample processing, data acquisition, particulate sample systems, gamma-gamma coincidence counting, new generation noble gas systems, radionuclide laboratories</td>
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<td>On-Site Inspection Techniques</td>
<td>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</td>
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<td>Integrating Data from Different Monitoring Technologies</td>
<td>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</td>
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<td>Analysis of Seismic, Hydroacoustic and Infrasound Monitoring Data</td>
<td>Signal processing, data analysis algorithms, reduction of analyst workload, artificial intelligence, bulletin quality, new approaches, adaptation and integration of methods used in other fields</td>
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<td>Analysis of Radionuclide Monitoring Data</td>
<td>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</td>
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### 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](http://ctbto.org/specials/vdec).
Airborne simulator in front of the Technology Support and Training (TeST) Centre in Seibersdorf, Austria.

**SUSTAINMENT OF NETWORKS, PERFORMANCE EVALUATION AND OPTIMIZATION**

The four IMS technologies

- **Seismic** stations monitor elastic waves in the earth. The vast majority of these are caused by earthquakes. However, the stations also detect man-made explosions such as the announced nuclear tests by the Democratic People’s Republic of Korea in 2006, 2009, 2013 and 2016.

- **Infrasound** stations can detect ultra-low frequency sound waves—inaudible to the human ear—that are emitted by large explosions.

- **Radionuclide** stations measure the atmosphere for radioactive particles; 40 of them also pick up noble gases. Only these measurements can give a clear indication as to whether an explosion was nuclear. The stations are supported by 16 radionuclide laboratories.

- **Hydroacoustic** stations ‘listen’ for sound waves in the oceans. Sound waves from explosions can travel extremely far under water.

**CTBTO Youth Group**

The 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 or visit youthgroup.ctbto.org.

**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 pages, please email SnT@ctbto.org.

**TOPICS**

- **T4.1 Performance Evaluation of the International Monitoring System and On-Site Inspection and their Components**
- **T4.2 Systems Engineering for International Monitoring System and On-Site Inspection**
- **T4.3 Enabling IT Technologies**
- **T4.4 International Monitoring System Sustainment**
- **T4.5 On-Site Inspection Team Functionality**

**KEYWORDS**

- 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

**KEYWORDS INDICATE WHAT MIGHT FIT UNDER THE TOPIC, INCLUDING PRIORITIES. POSSIBLE SUBMISSIONS ARE NOT LIMITED TO THE KEYWORDS.**
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](http://www.ctbto.org/SnT2023). 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*](http://www.ctbto.org/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.