



The European Union's Special Effort in Support of the Comprehensive Nuclear-Test-Ban Treaty



Background



CTBTO Executive Secretary Lassina Zerbo.



EU High Representative Mogherini and CTBTO Executive Secretary Zerbo with CTBTO Women Ambassadors, GEM members and senior staff.



The Vienna International Centre, Austria, home to the CTBTO.

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans nuclear explosions everywhere: underground, underwater and in the atmosphere. This effectively hampers the development and qualitative improvement of nuclear weapons. It also protects humans and the environment from radiation hazards that any tests may pose.

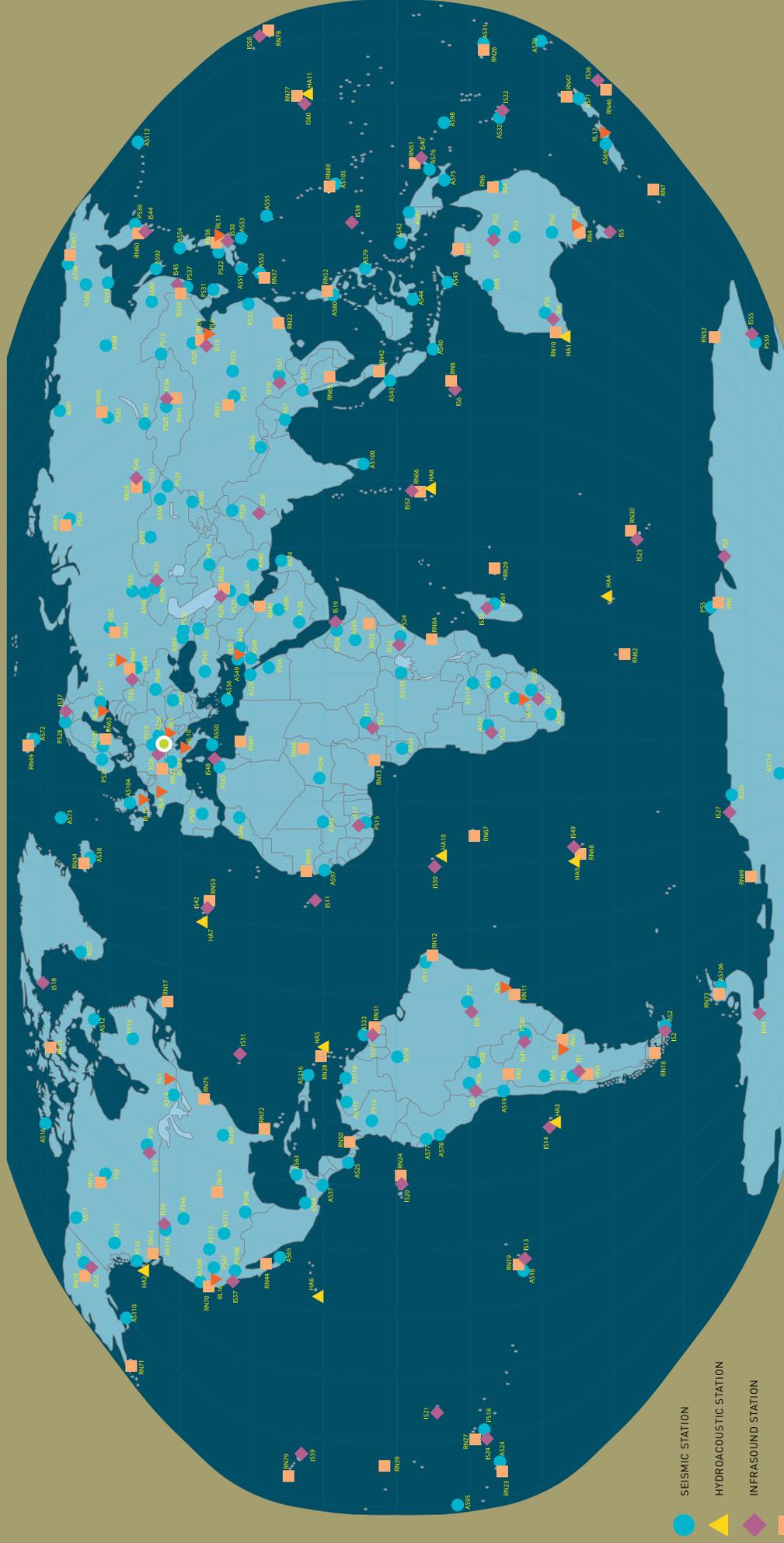
The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is an international organization based in Vienna, Austria, that has been tasked with establishing a global verification regime, unique in its scope and reach, to ensure that no nuclear explosion goes undetected. The different components of this regime include:

- **The International Monitoring System (IMS) comprising 337 seismic, infrasound, hydroacoustic and radionuclide facilities in 89 countries to monitor all environments for nuclear explosions;**
- **The International Data Centre (IDC), which collects, processes and analyses data from the IMS stations for subsequent dissemination to CTBTO Member States;**
- **Provisions for on-site inspections (OSI). The aim of an OSI is to establish whether or not a nuclear explosion has been carried out where the IMS has received data that points to such an event. An OSI can only be invoked once the CTBT has entered into force.**

As of February 2019, 184 countries have signed the CTBT, of which 168 have also ratified. The European Union's 28 Member States have all signed and ratified the CTBT. This includes the EU's two nuclear weapon States: France and the United Kingdom. The EU and its Member States also spearhead international efforts aimed at securing the remaining eight ratifications* necessary for the CTBT's entry into force.

* China, the Democratic People's Republic of Korea, Egypt, India, Iran, Pakistan, and the United States have yet to ratify.

INTERNATIONAL MONITORING SYSTEM



- SEISMIC STATION
- ▲ HYDROACOUSTIC STATION
- ◆ INFRASOUND STATION
- RADIONUCLIDE STATION
- ▲ RADIONUCLIDE LABORATORY
- INTERNATIONAL DATA CENTRE, CTBTO PREPCOM, VIENNA

The map shows the 337 facilities around the globe that make up the CTBTO's International Monitoring System.



CTBTO Executive Secretary Lassina Zerbo and EU High Representative for Foreign Affairs and Security Policy, Federica Mogherini, CTBT20 Ministerial Meeting June 2016.

Regular contributions from EU Member States to the CTBTO comprise roughly 40% of the organization's total budget of around € 114 million annually, making the EU the largest collective financial contributor to the organization. In addition, the EU is one of the largest providers of voluntary funds to the CTBTO, with contributions totalling around € 23.5 million since 2006. This brochure highlights the significant impact that these additional funds have had in further enhancing the CTBTO's capacity to detect nuclear explosions by strengthening its verification regime and promoting the entry into force through outreach and capacity building.

EU STRATEGY AGAINST THE PROLIFERATION OF WEAPONS OF MASS DESTRUCTION: "A SECURE EUROPE IN A BETTER WORLD"

In 2003 the Council of the European Union adopted its strategy against the Proliferation of Weapons of Mass Destruction, defining such weapons as potentially the greatest threat to European security. Within the framework of this strategy, the EU has embarked on a number of initiatives based on multilateralism, prevention and international cooperation.

»The EU policy is to pursue the implementation and universalization of the existing disarmament and non-proliferation norms. To that end, we will pursue the universalization of the Nuclear Non-Proliferation Treaty...and the early entry into force of the CTBT.«

EU STRATEGY AGAINST PROLIFERATION OF WEAPONS OF MASS DESTRUCTION, 2003

Promotion of the early entry into force of the CTBT as well as improvements to existing verification mechanisms and systems are some of the key elements of the EU's strategy in the field of nuclear disarmament.

CTBTO-EU COOPERATION ON INTERNATIONAL SECURITY AND PEACE

The EU has traditionally been a key supporter of the CTBTO, both politically and financially. Since 2006 this support has also materialized in the adoption of three Joint Actions and four EU Council Decisions in support of the CTBT. The overall objective of these is twofold:

1. To enhance the operational performance of the CTBT verification regime.
2. To enable CTBT Signatory States to fulfil their CTBT verification responsibilities and reap the full membership benefits including the potential civil and scientific application of CTBT monitoring data.

A fully operational and credible CTBT verification regime will provide both the international community and the EU with credible, reliable and independent means to ensure that the norm against nuclear testing is respected. Cooperation with the scientific community through the bi-annually held Science and Technology conference series is a critical element in this process.

Based on its unique expertise through its worldwide network of monitoring stations and the International Data Centre the CTBTO has the capacity to implement projects fulfilling the objectives of the EU Strategy and reinforcing the objectives of the Common Foreign and Security Policy of the European Union.

HOW EU SECURITY IS STRENGTHENED:

- CTBTO expertise contributes significantly to the EU Strategy.
- Global respect for the no-test norm prevents the qualitative and quantitative development of nuclear weapons, even before the CTBT's entry into force.
- Access to accurate and immediate data: even before North Korea announced its last nuclear tests, State Signatories received initial monitoring data and analysis from more than 100 CTBTO monitoring stations within hours of the event occurrence.
- Access to monitoring data for disaster mitigation, e.g. for tsunami warnings, and tracking the dispersion of radioactivity from nuclear power plant accidents. The data also offer a range of scientific and civilian applications such as research on the Earth's core, marine life and meteors, to name but a few potential uses.

THERE ARE FIVE
MAIN AREAS IN
WHICH THE EU'S
CONTRIBUTIONS
BENEFIT THE
CTBTO'S WORK



Training course on NDC Capacity Building, Vienna, June 2015

1 Technical Assistance and Integrated Capacity Building

In the CTBT verification regime, CTBTO Member States play a key role. While the CTBTO collects the monitoring data and provides it in raw form and as data bulletins, the Member States, through their National Data Centres (NDC), perform their own analysis to determine whether or not a suspicious event was a nuclear explosion.

To broaden the international basis of this decision-making process, integrated capacity building programmes provide assistance to developing countries to establish and increase expertise in their own NDCs. As of December 2018, around 140 countries with over 1,700 registered users were receiving CTBTO data and products.

SPECIFIC ASSISTANCE

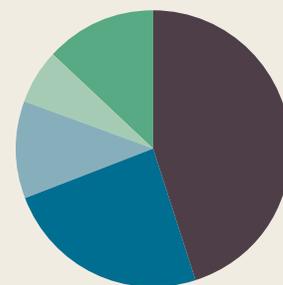
Technical workshops and training for experts from targeted regions in the use of CTBT monitoring data, including for disaster warning and research purposes. Just over 200 participants from eligible States have already taken part in 12 different training courses or attended a NDC workshop

PURPOSE

Enable experts from NDCs in beneficiary regions to participate fully and contribute to the CTBT verification regime.



CTBTO Infrasound Technology Workshop, Vienna, November 2018



CAPACITY BUILDING SYSTEMS (COMPUTER INFRASTRUCTURE) INSTALLED

- 28 Africa
- 15 Latin America and the Caribbean
- 7 South-East Asia, the Pacific and the Far East
- 4 Middle East/South Asia
- 8 Eastern Europe



2018 CTBTO GEM – Youth International Conference, Astana, August 2018

2 Outreach and Capacity Building

CTBT education activities and resources focus on building and maintaining necessary awareness and capacity regarding the technical, scientific, legal and political aspects of the Treaty and its verification regime.

By offering specialized education courses and utilizing online learning and new media, the CTBTO is expanding the pool of expertise beyond traditional stakeholders and is increasing active engagement on the critical issues underpinning the Treaty.

To advance the CTBT's further universalization and entry-into-force through ratification by the remaining Annex 2 States, a group of eminent personalities and internationally recognized experts was launched in 2013. Through their expertise and the weight of their own networks, the CTBTO Group of Eminent Persons (GEM) has supported and complemented the organization's efforts.

In February 2016, the CTBTO Youth Group (CYG) was launched to promote knowledge transfer to the next generation of leaders on the CTBT, and in turn, to revitalize discussion on the Treaty amongst civil society. The CYG has become a robust platform to build peer-to-peer relationships and much-needed dialogue, facilitating an understanding of the CTBT, its verification regime, and the invaluable benefits it provides for the planet. The CYG to date has close to 600 members, representing approximately 96 countries.

SPECIFIC ASSISTANCE

With generous financial support from the European Union, CYG members participated in and actively contributed to major global and regional events such as CTBT: Science and Technology 2017 Conference, the Moscow CTBTO Youth Conference, the 2nd CTBT Science Diplomacy Symposium, the 2018 CTBTO GEM-Youth International Conference, and the 9th Ministerial Meeting of the Friends of the CTBT.

PURPOSE

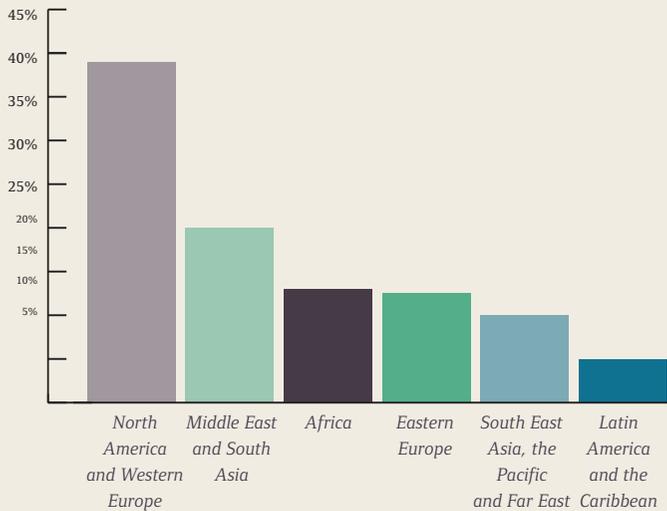
Revitalize the discussion around the CTBT among decision-makers, scientists, academia, civil society, and media.

Expand the pool of expertise beyond the traditional stakeholders and increase active engagement on the critical issues underpinning the Treaty.

Become a knowledge hub for future leaders who are directing their careers to contribute to global peace and security.



EU High Representative Mogherini and CTBTO Youth Group member at the ninth Ministerial Meeting of the Friends of the CTBT, United Nations, New York, September 2018.



PARTICIPANTS BY REGIONAL GROUP FOR THE 2016 AND 2018 SYMPOSIA ON SCIENCE DIPLOMACY

- 161 Africa
- 91 Eastern Europe
- 47 Latin America and Caribbean
- 171 Middle East/South Asia
- 241 North American and Western Europe
- 172 South-East Asia, the Pacific, and the Far East

PROJECT FOR EXPERTS FROM DEVELOPING COUNTRIES PARTICIPATING IN OFFICIAL TECHNICAL MEETINGS OF THE COMMISSION, IN PARTICULAR WORKING GROUP B SESSIONS.

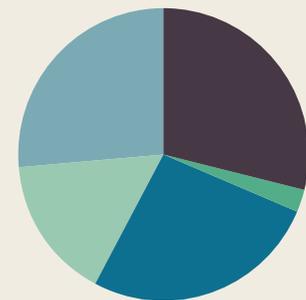
This entirely extra-budgetary funded project, established by the Commission in 2007, targets experts that work with CTBTO data and issues from developing countries including least developed countries according to the regularly updated OECD/DAC List of official development aid recipients. Thus far 38 State Signatories, totalling 49 individual experts, out of which 16 are women, were supported. The EU is one of only two institutional donors contributing to this project in the past few years.

Training Courses

EU Council Decision VI funded the participation of 42 experts in twelve NDC capacity-building training courses analysis of waveform and radionuclide IMS data held between 2016 and 2017. These courses were aimed at providing an understanding of the roles of NDCs in the verification regime, building and/or improving NDC capabilities and providing participants with sufficient knowledge for accessing and using IMS data and IDC products. These courses furthermore deepened the knowledge of waveform data and products analysis through real-time training exercises as well as allowing for intensive interaction with analysts

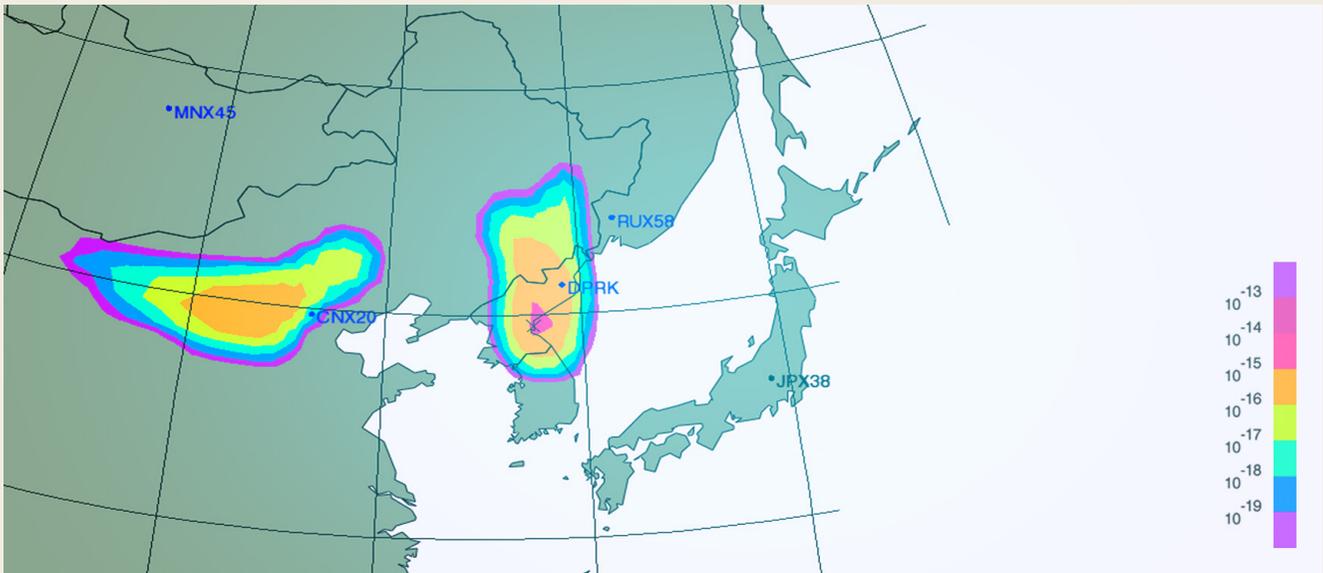
working at the IDC. This form of exchange between trainees and IDC analysts is mutually beneficial. On the one hand, it enables trainees to gain unique insight into the daily work and accumulated experience of analysts. On the other hand, the trainees provide analysts and IDC staff useful feedback to adjust the support and technical assistance extended to States Signatories.

The EU has provided institutional donor support to a pilot project aimed at capacity training experts from developing countries through participation in official technical meetings of the Commission.



EU FUNDING FOR PILOT PROJECT FOR EXPERTS; DISTRIBUTION BY REGION (2007-2019)

- 11 Africa
- 1 Eastern Europe
- 10 Latin America and the Caribbean
- 6 Middle East/South Asia
- 10 South-East Asia, the Pacific and the Far East



Snapshot of ATM of DPRK test

3

Enhancement of the CTBTO's Atmospheric Transport Modelling Capabilities

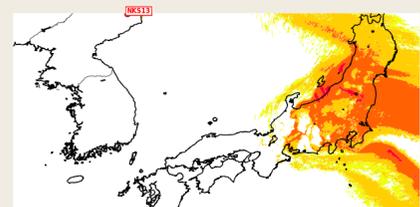
Atmospheric Transport Modelling (ATM) uses meteorological data to calculate how substances, e.g. radionuclides, that are released into the atmosphere disperse over time and where and when they are likely to be detected. Additionally, ATM can identify where and when a release may have occurred based on the location of detection.

The atmospheric transport simulation below is based on the hypothesis that a release of radionuclides occurred immediately and continuously from the location of the seismic detection. It showed the hypothetical release and plume dispersal.

Should traces of radioactivity have been released from the event, typically in the form of the radioactive noble gas xenon, they would need to be transported through the atmosphere to one of the radionuclide stations

in the region, detected, sampled and analysed. Results, if any, can be expected within days or weeks. After the 2013 announced nuclear test by North Korea, xenon was detected around 55 days after the event.

Improvements to the ATM capabilities are being made through software adjustments.



Activity concentration [Bq/m³]

SPECIFIC ASSISTANCE

Technical support through the provision of human resources to improve ATM capabilities.

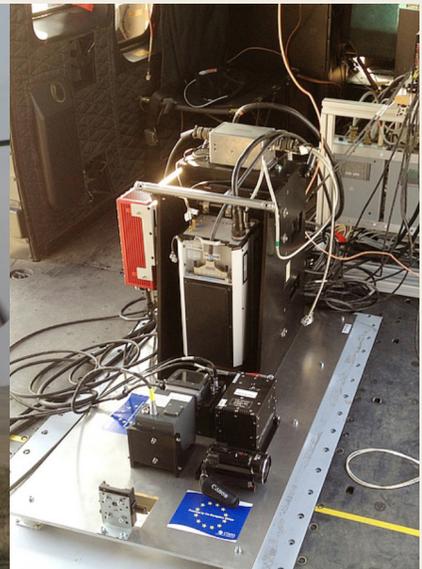
PURPOSE

Allow better tracking of the movement of airborne radioactive materials aimed at achieving a “cutting-edge ATM capacity.”

With the EU's support, the CTBTO is expanding its ATM potential, especially with regard to high resolution modelling, which can focus on any region of special interest. As a result, enhanced ATM simulations will be made available to CTBTO Member States.



Conducting airborne magnetic field mapping during the Integrated Field Exercise (IFE08) in Kazakhstan, 2008.



Testing multi-spectral imaging including infrared measuring equipment in Jordan, March 2014, in preparation for the Integrated Field Exercise (IFE14).

4 Support for the build-up of On-site Inspection Capabilities

In the past 20 years several different systems have been developed for collecting and analyzing radioactive noble gases (primary radon and radioargon), both for the international monitoring system (IMS) and for the OSI-regime. As a capability building and to test the concept of the noble gas collection and analysing capability in field, several noble gas analyzing systems were developed. These systems were then tested in the field during the integrated field exercise for the OSI regime in Jordan 2014 (IFE14). One of these systems was SAUNA (Swedish Automatic unit for Noble Gas Acquisition) Field, which was previously known as OSI-SAUNA, but will henceforth be referred to as SAUNA Field (or SAUNA-F).

This project is a continuation of this capability building and examines, based upon lessons learned from the IFE14 and other exercises, what needs to be modified and improved on the radioactive xenon field laboratory systems in order to enhance the performance during an OSI.

Development of multispectral and infrared sensors for installation on helicopters or other aircraft to capture image data at specific frequencies across the electromagnetic spectrum was funded by the EU as a result of IFE 14.



IMS Station, Antarctica

5 Civilian and Scientific Applications

While the establishment of the CTBT verification regime is a prime example of multilateralism in arms control, the IMS has also proved to be of great value for scientific applications, including contributing to disaster risk reduction. Data generated by the IMS is used in the provision of critical information on nuclear accidents, including measurements of radioactivity and the dispersion of radioactivity; the rapid acquisition and dissemination of data on earthquakes, in particular on potentially tsunami-generating earthquakes; and the detection of man-made and natural events on the Earth's surface, including chemical explosions, meteoroids entering the atmosphere, and severe storm systems. IMS data has also proved useful to civil aviation through early detection of volcano eruptions and tracking the path of resulting ash plumes.

The global alarm system of the CTBTO, designed to detect all nuclear explosions, can also detect earthquakes that can cause tsunamis. The information is picked up by seismic and hydroacoustic stations which monitor underground and the oceans respectively. It is provided by the CTBTO in near real-time to tsunami warning centres, in particular those covering the Pacific and Indian Oceans, to help them issue more timely and precise warnings. At present, tsunami warning centres in 14 countries with a high tsunami risk receive data from around 100 CTBTO stations.

The CTBTO's infrasound stations register any large source of infrasound, anywhere on the planet. Infrasound is sound vibrations at frequencies too low to be heard by the human ear. The stations detect for example volcanic eruptions or the

breaking up of ice shelves. The CTBTO's Member States and international and national institutions responsible for aviation and maritime safety (for underwater volcanoes) receive this information so that they can warn their citizens.

The CTBTO has 80 extremely sensitive sensors to detect radioactivity. Apart from detecting nuclear explosions, these stations will also register the dispersion of radioactivity stemming from other sources anywhere in the world, in particular from nuclear power plant accidents. This information is made available to all CTBTO Member States, whose radiation protection and public health agencies can use it to inform the public. This was the case during the 2011 Fukushima power plant accident, when the levels of radioactivity detected outside of Japan were found safe.



IMS Radionuclide Station, Spitsbergen, Norway

Non-verification uses of CTBTO data are also amongst the prominently discussed issues at the CTBT Science and Technology conferences, to which the broader scientific community is invited every other year.

Virtual Data Exploitation Centre (vDEC)
The virtual Data Exploitation Centre (vDEC) provides scientists and researchers from many different disciplines and from around the globe with access to CTBTO data to conduct research and to publish new findings.

Auxiliary seismic stations supplement the CTBTO's network of primary seismic stations and monitoring data are available upon request by Member States. It is responsibility of Member States to maintain auxiliary stations. The EU has supported throughout several past EU Council Decisions the upgrade, bug fixing and troubleshooting of auxiliary seismic stations in developing countries.



IMS Radionuclide Station, Resolute Nunavut, Canada



Civil and science applications of IMS data are provided to 14 tsunami warning centers.

EXAMPLES OF CIVIL AND SCIENTIFIC USES:

DETECTION AND REAL TIME WARNING OF:

- Earthquakes and tsunamis
- Radiation dispersal from nuclear accidents
- Volcanic eruptions

SCIENTIFIC RESEARCH ON:

- The Earth's core
- Climate Change
- Meteorology
- Break up of ice shelves and the creation of icebergs
- Oceans and marine life
- Meteors
- Worldwide background radiation

14 TSUNAMI WARNING CENTRES RECEIVE CTBTO DATA

<u>Australia</u>	<u>Myanmar</u>	<u>Turkey</u>
<u>France</u>	<u>Philippines</u>	<u>USA</u>
<u>Greece</u>	<u>Portugal</u>	
<u>Indonesia</u>	<u>Republic of Korea</u>	
<u>Japan</u>	<u>Russian Federation</u>	
<u>Malaysia</u>	<u>Thailand</u>	

