Achievements and Challenges

1996
CTBT opens for signature

1997
CTBTO begins work in Vienna

1998
Nuclear tests by India and Pakistan

1999
U.S. Senate fails to give consent to CTBT ratification

2000
First hydro-acoustic station certified

2001
First radionuclide laboratory certified

20 years of the CTBT

The depositary of the CTBT, United Nations Secretary-General Boutros Boutros-Ghali, formally opened the Treaty for signature on 24 September 1996. Following the United States, the other four Nuclear Weapon States (China, France, the Russian Federation, and the United Kingdom) all signed the Treaty that day in New York.

By the end of the day, another 66 States had signed the Treaty and taken the first steps towards making the commitment never to conduct nuclear tests of any kind anywhere on Earth.

With Wolfgang Hoffmann as its Executive Secretary and just a handful of staff, the CTBTO started its operations on the seventh floor of the Vienna International Centre on 17 March 1997.

Even though the Treaty negotiations had been long and complex, the period between the Treaty’s opening for signature on 24 September 1996, the first meeting of the CTBTO on 19 November 1996, and the date the organization started its operations, comprised of only six months.

Two weeks after India conducted two sets of nuclear tests, Pakistan responded by exploding two sets of its own underground nuclear devices on 28 May 1998. The tests sparked international condemnation and resulted in the universal adoption of United Nations Security Council Resolution 1172 demanding that both countries refrain from further tests and accede to the CTBT.

Although the CTBTO was still in its infancy, the organization was already receiving data from its initial seismic stations. It was therefore able to provide Member States with estimates of the time and location of the events.

On 13 October 1999, the U.S. Senate voted 51-48 against the Treaty, well short of a required two-thirds majority for Treaty ratification. The Senate’s failure to ratify the CTBT marked the first time that a national legislature had rejected the CTBT.

On 10 December 2000, the first IMS hydroacoustic station was certified. HA08 is located on the island of Diego Garcia in the British Indian Ocean Territory. IMS hydroacoustic stations monitor the oceans for evidence of a nuclear explosion. Installation of the stations is a highly specialized and costly operation, involving numerous technical and logistical challenges.

Now nearly complete, the network comprises of 11 stations. Comparatively few hydroacoustic stations are required because of the efficient transmission of sound through water, meaning that even small signals are readily detectable at very long distances.

On 31 October 2001, the world’s first radionuclide laboratory was certified. RL03 is located just outside Vienna, Austria.

Radionuclide stations detect radionuclide particles and noble gases like xenon which can help provide evidence of a nuclear explosion. Radionuclide laboratories provide support for the analysis of information collected by radionuclide stations. Today, the network includes 16 laboratories worldwide.
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Speaking on CNN after the Senate failed to ratify the CTBT, U.S. Secretary of State Madeleine Albright noted, “What we’ve lost for the time being is the real international leadership in terms of trying to make others live up to the CTBT.”

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Achievements and Challenges

2002
Almost 50 IMS stations fully operational

2003
CTBT reaches 100 ratifications

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2005
Use of CTBT data for tsunami warning purposes

2006
1st nuclear test by the DPRK

2007
Over 200 facilities fully operational

Primary seismic station PS19 in Freyung, Germany, was one of 11 seismic stations to be certified in 2002. The yellow markings in the picture indicate the array element configuration. Seismic stations monitor the Earth for underground nuclear explosions. Primary seismic stations relay data continuously in real time to the International Data Centre in Vienna. Auxiliary seismic stations provide information only upon request.

When complete, the seismic network will comprise 50 primary stations and 120 auxiliary stations around the globe.

Mauritania’s ratification on 30 April 2003 increased the number of ratifications to 100.

The photo shows radionuclide station RN43 in the distance during a sandstorm at Nouakchott, Mauritania. A number of other countries signed or ratified the CTBT in 2003: Afghanistan, Albania, Algeria, Côte d’Ivoire, Cyprus, Eritrea, Gambia, Honduras, Kuwait, Kyrgyzstan, Oman, and Palau.

When infrasound station IS36 on New Zealand’s Chatham Island was certified on 24 November 2004, it became the 100th IMS station to become fully operational. When complete, a network of 60 infrasound stations will monitor the Earth for atmospheric nuclear explosions.

The construction of infrasound stations around the globe since 1997 has contributed to a revival of scientific interest in this technology.

Two weeks later, IMS radionuclide station RN16 in Yellowknife, Canada, registered a high concentration of the radionuclide xenon-133. Using Atmospheric Transport Modelling calculations, scientists at the CTBTO could link the detection of xenon-133 at RN16 to the site of the explosion in DPRK, providing “smoking gun” evidence of a nuclear test. The DPRK is the only State to carry out nuclear tests this century.

In addition to 2006, announced tests took place in 2009, 2013, and 2016.

On 9 October 2006, the Democratic People’s Republic of Korea (DPRK) announced that it had conducted a nuclear test. Over 20 IMS stations detected the event. Less than two hours later, Member States received information on the time, location, and magnitude of the event.

The value of the IMS for disaster mitigation is demonstrated by its applications. After the massive tsunami caused by an earthquake off the coast of Sumatra, Indonesia, on 26 December 2004 claimed the lives of over 230,000 people, CTBTO Member States gave approval in 2005 for the use of CTBT verification data for disaster mitigation purposes.

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Around 450 scientists from over 70 countries congregated at the Hofburg Palace in Vienna to assess the CTBT’s capability and readiness to detect nuclear explosions anywhere on the planet.

Participants at the International Scientific Studies conference also discussed how the CTBT’s global alarm system could benefit from future scientific and technological developments.

“I have called on numerous occasions for those States whose ratification is required for the Treaty’s entry into force to act first without waiting for others to do so … be courageous. Take the initiative. Be the first movers”, said UN Secretary-General Ban Ki-moon, at UN Headquarters, New York, in September 2010. Earlier in the year, the Nuclear Non-Proliferation Treaty Review Conference agreed a final document that reaffirmed “the vital importance of the Comprehensive Nuclear-Test-Ban Treaty as a core element of the international nuclear disarmament and non-proliferation regime”. It also listed five action points including the aim of the entry into force of the Treaty.

By the end of 2010, 182 countries had signed the CTBT and 153 had ratified.

After the 11 March 2011 devastating tsunami caused serious damage to the Fukushima Daiichi nuclear power plant in Japan, the CTBTO provided 120 Member States and 1,200 institutions, as well as international organizations concerned with disaster mitigation, with information about the composition and dispersal of radioactive materials stemming from the plant.

The CTBTO also became a reliable source of information to the media and the general public worldwide on the radioactive dispersal.

On 6 February 2012, Indonesian Foreign Minister Marty Natalegawa deposited his country’s instrument of ratification of the CTBT with UN Secretary-General Ban Ki-moon at UN Headquarters in New York. As one of the 44 Annex 2 countries that must ratify the CTBT before it can enter into force, Indonesia’s ratification was very significant. “I am determined to ensure that Indonesia’s decision today will create momentum to encourage others who are still holding out to do the right thing. And the only right thing is to ratify the CTBT now, no more procrastination, no more delaying because it is right, it is proper, and it makes a more secure world”, said Natalegawa.

Over a four-week period, the CTBTO simulated its first entire on-site inspection (OSI), allowing the organization to assess the readiness of the OSI regime. The inspection area was located in a remote corner of Semipalatinsk – the Soviet Union’s nuclear test site – ensuring that equipment was tested under realistic conditions. Around 200 participants were involved and over 50 tonnes of equipment were shipped to the site.

“Let’s act first without waiting for others to do so … by the first moves”, said UN Secretary-General Ban Ki-moon, at UN Headquarters, New York, in September 2010. Earlier in the year, the Nuclear Non-Proliferation Treaty Review Conference agreed a final document that reaffirmed “the vital importance of the entry into force of the Comprehensive Nuclear-Test-Ban Treaty as a core element of the international nuclear disarmament and non-proliferation regime”. It also listed five action points including the aim of the entry into force of the Treaty.

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2012
Indonesia ratifies the CTBT – most recent Annex 2 State to ratify

2011
Fukushima Daiichi Disaster

2010
Intensified Calls for the Entry into Force of the Treaty

2009
Hundreds of scientists flock to Vienna

2008
CTBTO simulates on-site inspection exercise in Kazakhstan
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On 15 February 2013, at 03:22 GMT, 20 of the CTBTO’s infrasound stations detected signals from a meteor that entered the atmosphere and disintegrated in the skies over Chelyabinsk, Russia. The sub-audible sound was detected by the IMS from as far as 15,000km away in Antarctica. The data recorded helped scientists to locate the meteor, measure energy release, its altitude, and size. Margaret Campbell-Brown, an Associate Professor in the Department of Physics and Astronomy at the University of Western Ontario, Canada, commented, “Statistically, something this size hits the Earth approximately once every 50 years, though nothing this size or larger has been observed to hit the Earth since 1908. This event was nearly ten times as energetic as the Sulawesi, Indonesia, fireball of 2009”.

From 3 November to 9 December 2014, Integrated Field Exercise 2014 (IFE14) simulated a CTBTO on-site inspection in the Hashemite Kingdom of Jordan. The inspection team conducted a meticulous search to establish whether or not a nuclear explosion had occurred. The exercise was in response to a technically realistic but fictional scenario. IFE14 involved four years of preparation, 150 tonnes of specialized equipment, and over 200 international experts. During the five week-long exercise, the inspection team searched an inspection area of nearly 1,000 square kilometres using 15 of the 17 techniques permissible under the CTBT.

“Through this exercise, we have shown the world that it is absolutely hopeless to try to hide a nuclear explosion from us. We’ve now mastered all components of the verification regime, and brought our on-site inspection capabilities to the same high level as the other two components, the 90% complete network of monitoring stations and the International Data Centre”, said CTBTO Executive Secretary, Lassina Zerbo.

On 27 April 2016, at a CTBTO panel discussion, UN Secretary-General Ban Ki-moon stated, “the eight countries that must ratify for entry into force have a special responsibility. They can advance us on the road to a nuclear weapon-free world. All countries can add to the pressure by ratifying. This strengthens the norm of universality. And it shows the world is united against nuclear tests”. Furthermore, he welcomed the voluntary moratoria against nuclear testing, but noted that this would never substitute for a legally binding CTBT.

The High-Level Ministerial Meeting in June 2016 looks to sustain and generate further political momentum, as well as public attention, for the entry into force of the Treaty.
Achievements and Challenges

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The CTBTO Science and Technology 2015 Conference (SnT2015) took place from 22 to 26 June 2015 at the Hofburg Palace in Vienna, Austria. It was the largest in a series of multidisciplinary conferences designed to further enhance the strong relationship between the scientific and technological community and the CTBTO. The conference series provides a forum for scientists from around the world to exchange knowledge and share advances in the monitoring and verification technologies of relevance to the CTBT. Such interaction helps ensure that the Treaty’s global verification regime remains at the forefront of scientific and technical innovation.

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