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**Conference on Facilitating the Entry into Force  
of the Comprehensive Nuclear-Test-Ban Treaty**  
New York, 25 September 2019

**BACKGROUND DOCUMENT BY  
THE PROVISIONAL TECHNICAL SECRETARIAT OF  
THE PREPARATORY COMMISSION FOR  
THE COMPREHENSIVE NUCLEAR-TEST-BAN  
TREATY ORGANIZATION  
PREPARED FOR THE CONFERENCE ON FACILITATING  
THE ENTRY INTO FORCE OF THE CTBT (NEW YORK, 2019)**

**TREATY**

1. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all nuclear test explosions, whether for a military or any other purpose. It covers all environments and does not set a threshold from which the prohibitions should apply. The preamble of the Treaty states that its objective is “to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects” and “to the process of nuclear disarmament”.
2. The CTBT, and the international norm of non-nuclear testing, have grown in strength since the adoption of the Treaty in 1996. In order to enter into force, the CTBT must be ratified by all 44 States listed in Annex 2 to the Treaty. These are the States which formally participated in the work of the 1996 session of the Conference on Disarmament, thus having contributed to the final stage of the negotiations on the CTBT, and which appear in the lists, compiled by the International Atomic Energy Agency (IAEA), of States with either nuclear power reactors (as of April 1996) or nuclear research reactors (as of December 1995).
3. Significant progress has been made towards the goal of entry into force and universalization of the Treaty. To date, the CTBT has been signed by 184 States and ratified by 168 States, including 36 of the 44 States listed in Annex 2. Since the 2017 Article XIV conference, Thailand and Zimbabwe completed their ratification procedures in September 2018 and February 2019, respectively.

## **2017 ARTICLE XIV CONFERENCE**

4. Under Article XIV, if the Treaty has not entered into force three years after the date of the anniversary of its opening for signature, a conference of those States that have already ratified it may be held to decide by consensus what measures consistent with international law may be taken to accelerate the ratification process and to facilitate entry into force. States Signatories will also be invited to attend the conference.
5. The tenth Article XIV conference<sup>1</sup> was held on 20 September 2017 in New York with more than 90 States participating. In addition, several international and regional organizations as well as non-governmental organizations attended. The conference adopted a Final Declaration calling upon all States which had not yet done so to sign and/or ratify the Treaty (CTBT-Art.XIV/2017/6, Annex). The declaration includes a number of measures to promote the entry into force of the CTBT.
6. In the course of the follow-up to the 2017 Article XIV conference, and in accordance with paragraph 9(c) of the Final Declaration, Belgium and Iraq, which served as the Presidency of the conference, were selected as coordinators of the process “to promote cooperation aimed at promoting further signatures and ratifications”. On 21 February 2019, at informal consultations within the framework of this ‘Article XIV process’, Algeria and Germany were appointed to serve as Presidents-designate in preparing for the 2019 Article XIV conference in New York.

## **PREPARATORY COMMISSION**

7. In advance of the entry into force of the Treaty and the establishment of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), a Preparatory Commission was established by States Signatories on 19 November 1996. Its purpose is to carry out the necessary preparations for the effective implementation of the CTBT and to prepare for the first session of the Conference of the States Parties to the Treaty. Altogether 183 States are members of the Commission.
8. The Commission has two main activities. The first consists of undertaking all necessary preparations to ensure that the verification regime foreseen by the CTBT is capable of fulfilling its operational mission at entry into force. The second is the promotion of signature and ratification of the Treaty to achieve entry into force. The Commission is made up of a plenary body responsible for directing policy and composed of all States Signatories, as well as a Provisional Technical Secretariat (PTS) which assists the Commission in its duties and carries out such functions as the Commission determines.

## **PROVISIONAL TECHNICAL SECRETARIAT**

9. As of 30 June 2019, the PTS comprised 285 staff members from 86 countries. The number of staff at the Professional level was 190. The PTS is committed to a policy of equal employment opportunity, with a particular emphasis on improving the

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<sup>1</sup> Previous Article XIV conferences were held in Vienna (in 1999, 2003 and 2007) and in New York (in 2001, 2005, 2009, 2011, 2013, 2015 and 2017).

representation of women, especially in the scientific and technical areas within the Professional category. Fifty-nine women held Professional positions as of 30 June 2019, corresponding to 31.05% of the Professional staff.

10. The approved Budget of the Commission for 2019 amounts to US\$134.03 million. From 1997 up to and including the financial year 2019, the total budgetary resources amounted to \$1329.67 million and €841.63 million. In equivalent US dollars this corresponds to a total of \$2386.99 million calculated using the budgetary rate of exchange of €1 = \$0.796. Of this total, 79.7% has been dedicated to verification related programmes, including \$464.95 million (19%) for the Capital Investment Fund for the installation and upgrade of IMS stations.

## **VERIFICATION REGIME**

11. The CTBT provides for the establishment of a unique global verification regime that consists of an International Monitoring System (IMS), a consultation and clarification process, on-site inspections (OSIs) and confidence building measures. Data from IMS stations are to be sent via a secure global satellite network (the Global Communications Infrastructure (GCI)) to an International Data Centre (IDC) for processing and analysis, and IMS data and IDC products are to be made available to States.

### **International Monitoring System**

12. The IMS is to consist of a network of 321 monitoring stations and 16 radionuclide laboratories. The mission of these facilities is to produce data for the detection of nuclear explosions. These data are to be provided to States Parties for verification of compliance with the Treaty after entry into force.
13. The momentum to complete the IMS network continues at a moderate pace. As of 30 June 2019, 294 (91.6%) IMS stations had been installed, of which 284 had been officially certified as meeting the specifications of the Commission. In addition, since mid-2017, two further radionuclide laboratories (RL8, France and RL15, United Kingdom) were certified for noble gas analysis capability, bringing the total to four. As a result of political agreements and successful outreach activities, progress is being made in the establishment of stations in a number of States where there had been no or little progress. This will lead to additional IMS facility certifications in the coming years. Following the recognition of the importance of noble gas monitoring after the events in the Democratic People's Republic of Korea in 2006, 2009, 2013, 2016 and 2017, the PTS has continued to emphasize noble gas technology. As of 30 June 2019, of the 40 noble gas detection systems envisaged by the Treaty, 31 had been installed, of which 25 systems have been certified (63%).
14. In addition, the continued political support from a number of countries hosting IMS facilities brings the prospect of a complete IMS network closer.

## International Data Centre

15. The mission of the IDC is to support the verification responsibilities of States by providing data, products and services necessary for effective global monitoring after the entry into force of the Treaty.
16. The IDC continues in its provisional mode of operation and supports States Signatories by acquiring and forwarding continuous real time data, selected data segments and radionuclide spectra from the IMS. The IDC processes the IMS data along with compiled meteorological data and distributes the resulting products to support the verification responsibilities of States as well as their civil and scientific efforts. On average 11 terabytes of data and products are distributed every year. States are supported through an online help desk, data retrieval services, training courses, workshops, software and equipment.
17. The GCI receives and distributes IMS data and IDC products. Using a combination of satellite, terrestrial and Internet technologies, this communications infrastructure now spans over 100 countries and territories. Subnetworks are being operated in eight States Signatories to complement the GCI. Adjustments to the physical infrastructure and procedures are made from time to time to ensure that the GCI continues to transmit data and products securely with 99.5% availability every year.
18. Through the International Noble Gas Experiment, support from European Union Council Decision VII, contributions in kind from the United States of America (USA), and voluntary contributions from Japan, the PTS has been optimizing the capability of detecting signals from nuclear explosions against the global background of natural and man-made radionuclides. The overall goal is to enhance the detection capability of the IMS noble gas systems in order to make them as sensitive as possible to nuclear explosions.
19. The PTS continued its work on the enhancement of the quality of automatic processing results for particulate samples. This helped reduce the analyst workload. Further enhancements since 2016 improved the consistency of results both for automatic and reviewed radionuclide reports. Developments in the processing of data from the next generation noble gas systems and the modernization of interactive analysis software tools continued.
20. The first phase of IDC re-engineering was completed in December 2015. The undertaking modernized major aspects of IDC software, such as the system for IMS data and IDC product dissemination, the middleware software that controls the automatic processing of seismic, hydroacoustic and infrasound data, and software modules that perform quality control on waveform segments. The second phase of IDC re-engineering was completed in April 2017. It resulted in the design of a new unified software architecture that will guide further development and sustainment of the IDC processing software. The third phase commenced in December 2018. The US government will donate a large body of software to the PTS, which comes from the modernization effort of their own National Data Centre (NDC), with much of the software fully compatible with PTS' requirements. This software will be integrated with contributions from other states parties and thoroughly tested.

21. Since 2016, the PTS released major upgrades of the current seismic, hydroacoustic and infrasound data analysis software provided to NDCs with new functionalities, in particular in the area of infrasound and hydroacoustic processing and real time automatic processing. The project was supported financially through EU Council Decision V, VI and VII. The new version of the software enables NDCs to more easily combine IMS data and IDC products with data from local and regional stations and from other global networks. The PTS continuously enhances and extends the capabilities of software for NDCs.

### **Sustaining and Maintaining the IMS**

22. In accordance with Article IV of the Treaty, the PTS supervises, coordinates and ensures the operation of the IMS and its component elements. Preparing a global verification regime is not just about building stations. It is about taking a holistic approach to establishing and sustaining a system that meets the verification requirements of the Treaty and ensures minimal downtime of IMS facilities. Operational experience with the system has increased over time, leading to the establishment of an IMS sustainment structure and concerted efforts for more effective operations, preventive maintenance, logistical and engineering strategies and programmes. These sustainment activities are essential to preserve the investment already made by States Signatories.
23. The PTS has continued to enhance its expertise in configuration management, logistics support analysis, establishment of equipment support contracts, shipping and customs clearance, and equipment sparing in support of optimizing IMS station operability and uptime. It has also continued to recapitalize IMS facility components reaching the end of their operational lives and to address unscheduled maintenance in a timely fashion. Furthermore, owing to the central role played by station operators in resolving problems on site and hence contributing to high levels of data availability, the PTS has continued to invest in training courses for station operators that are tailored to their needs. Monitoring and tracking software has been enhanced to further facilitate the tasks of monitoring, detecting and resolving incidents in the IMS network.
24. As the IMS network grows, the costs associated with its sustainment also rise. Provisions are in place to address peaks in obsolescence of IMS equipment in the medium term. The PTS is continuing to refine and validate life cycle models of IMS stations to optimize sustainment of the IMS, including its cost.
25. Operation and maintenance of IMS auxiliary seismic stations are the responsibility of the host countries. While some progress has been made over the last two years, resulting in maintained levels of data availability and a better understanding of roles and responsibilities for sustainment, further efforts involving close collaboration with States Signatories are required. The European Union provides financial support for IMS auxiliary seismic stations that do not belong to parent networks and are hosted by developing countries or countries in transition.
26. Increasing the number of facility agreements and arrangements between the Commission and the States hosting IMS facilities is important for providing the

required support for the functioning and sustainment of the IMS. As of 30 June 2019, facility agreements had been signed with 49 of the 89 host States, and 41 of these agreements had entered into force. The development and implementation of mechanisms such as timely customs clearance and tax exemption for equipment brought into an IMS host State has proven to be highly relevant.

27. The PTS has continued to focus on engineering and development activities with the aim of improving the robustness of IMS monitoring facilities and enhancing the performance and capabilities of associated technologies. This is being achieved through designing, validating and implementing solutions throughout the life cycle of IMS stations. Notably, grounding and lightning standards have been updated to international standards and are being progressively implemented throughout the IMS, and new guidelines for power at IMS stations have been developed.
28. Significant progress has been made in the quality assurance/quality control (QA/QC) programme of the IMS network. The calibration procedures for infrasound stations are now complete. Calibration of infrasound stations will in future be included in the scheduled calibration of primary and auxiliary seismic and T phase stations that is performed on an annual basis with the support of station operators. Similarly, a comprehensive QA/QC programme is in place for all radionuclide stations. In addition, testing and implementation of pilot QA/QC procedures at radionuclide laboratories with noble gas capability has continued with good results.
29. Up to date and reliable technical documentation for each IMS station is essential to ensure its sustainability and to maintain a high level of data availability. The PTS made substantial progress populating its Quality Management System (QMS) with station specific documentation. By 30 June 2019, standard drawings for 51 IMS stations were completed and 89% of required reports and records were made available.
30. Technology road maps that capture knowledge and developments in the technological and scientific communities, the requirements of stakeholders and the benefits derived from strategic partnerships were continuously reviewed and updated by the PTS. This has allowed the PTS to keep abreast of technological advances and of the next generation engineering designs that it will implement, resulting in a more robust and cost effective IMS while enhancing its performance and maintaining its relevance.
31. There are currently two major technological developments in progress: (i) the next generation of noble gas systems that have improved sensitivity and enhanced reliability are under development and testing; (ii) a hybrid modular design concept has been identified as the optimal approach to enable reparability of individual nodes and underwater system subcomponents of hydroacoustic hydrophone stations.
32. Significant efforts and re-engineering of the information technology infrastructure has ensured high availability of all information technology equipment and systems in use. For instance, the availability of infrastructure supporting critical IDC verification capabilities was 99.9% for the period January to June 2019. Through a combination of different approaches, including redundancy, secure storage and clustering, the effects of hardware failure and human error have been minimized.

33. High levels of data availability from IMS stations are being achieved. This has been achieved through the PTS' operation and sustainment strategy and the joint efforts with delegations, national governments, station operators and national institutions. In 2018, the data availability levels remained high for certified IMS stations with average data availability of 87.8% for the primary seismic station network, 98.3% for the infrasound station network, 90.1% for the hydroacoustic station network, and 85.2% for the auxiliary seismic station network. The radionuclide network performed at a level of 90.9% (particulate stations) availability and 92% (noble gas systems) in 2018.
34. Post-certification activity (PCA) contracts, agreements and arrangements support station operators in operating and maintaining primary IMS stations after certification. There are 164 PCA contracts for certified primary IMS stations. The PTS has developed standardized operation and maintenance plans, which by the end of 2018 had been implemented by 129 stations. This approach helps to keep operational costs at a reasonable level while ensuring sufficient funding to keep the stations well maintained. Keeping the operational costs of IMS stations at a reasonable level is a joint responsibility of the PTS and the host country.

### **On-Site Inspections**

35. On-site inspections represent the ultimate verification measure of the CTBT in order to address possible compliance concerns with the Treaty. An OSI can only be invoked after the entry into force of the Treaty. The sole purpose of OSI is to clarify whether a nuclear weapon test explosion or any other nuclear explosion has been carried out in violation of the Treaty and to gather facts which might assist in identifying any possible violator.
36. The Commission has continued to build up the OSI verification regime in accordance with Treaty requirements. Considerable progress has been made with the implementation of the OSI action plan and the commencement of the third training cycle for inspectors. The project to build the Technology, Support and Training (TeST) Centre was completed. The centre was opened with the participation of high representatives from the host country, States Signatories and PTS staff, and was inaugurated on 19 June 2019.

### ***OSI Action Plan***

37. The action plan consists of 43 projects categorized into five functional categories listed below. The projects originated from lessons identified during the Integrated Field Exercise (IFE) held in 2014. The action plan will conclude in December 2019, the outcomes of which will be reviewed by the policy making organs:
- OSI policy development, methodology and documentation;
  - OSI operations and operations support;
  - OSI techniques and equipment development;
  - OSI inspectorate development;
  - OSI infrastructure development.

### *Third Training Cycle for Inspectors*

38. The third training cycle as a further development of the OSI training programme builds upon the two previous training cycles. Its basic model originates in the long range plan for the OSI training and exercise programme (CTBT/PTS/INF.475) and draws on the evaluations, recommendations, lessons and experience from the first and second training cycles leading up to the IFE in 2014 as well as from the IFE itself.
39. WGB agreed with the proposed training cycle and its implementation at its Forty-Sixth Session. Subsequently, the PTS circulated a note verbale calling upon all States Signatories to nominate suitable candidates for participation in the third OSI training cycle for surrogate inspectors through their Permanent Missions, in accordance with the announcement which included a description of requirements and qualifications.
40. The cycle commenced in October 2016. To date, the introductory block has been completed. It comprised three courses: the Introductory Course (core inspection skills), the Health Safety and Security Course and the In-field Operations Support Course (logistics and sustainment of an inspection team in the field). The advanced component of the cycle started in October 2018 and will continue until the end of 2019.

### *Technology, Support and Training Centre, incorporating an Equipment Storage and Maintenance Facility*

41. In 2015, the PTS signed an agreement to lease premises of the Austrian Institute of Technology in Seibersdorf, Austria, as a temporary storage area (TSA) to house PTS equipment after the closure of the Equipment Storage and Maintenance Facility (ESMF) in Guntramsdorf, Austria. Full access to the TSA was granted on 15 December 2015, and the lease ran until 31 January 2019, at which time the TSA was vacated as the new ESMF opened. The ESMF is a component of the PTS-wide TeST Centre, and will be used by all the technical divisions to further develop and enhance the verification regime.
42. At its Forty-Seventh Session, the Commission decided to fund the construction of a new Centre from its 2014 cash surplus balance, with the remainder of the funding to be provided through the Regular Budget.

### **ANNOUNCED NUCLEAR TEST BY THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA IN SEPTEMBER 2017**

43. With a body wave magnitude of 6.1 the announced nuclear test by the Democratic People's Republic of Korea on 3 September 2017 was significantly larger than any of the previous five tests.
44. The performance of the verification system was timely and effective and proved the value of the investment made in its establishment.

45. In addition, several aftershocks were recorded. The first had a body wave magnitude of 4.1 and occurred 8.5 minutes after the nuclear test. The aftershock activity in the area of the test site continued throughout 2017 and 2018.
46. The announced test was detected by the IMS facilities and the data were shared with States Signatories in near real time. The States Signatories received the reviewed data products within the defined time lines. The Commission also held briefings to discuss the findings of the verification system.
47. The response of the IMS and the IDC to the test established that their capabilities are nearing full maturity. In addition, the tests underlined the significance of the OSI mechanism as a complementary element of the verification regime and the need for constant testing and validation of the regime.
48. The international reaction to the announced tests was swift and strong. Many countries condemned the nuclear tests and considered such actions to seriously threaten international peace and security. They called on the Democratic People's Republic of Korea to cease any further tests and to immediately sign and ratify the Treaty.

## **QUALITY ASSURANCE AND PERFORMANCE MONITORING**

49. The PTS undertakes to continuously enhance effectiveness and efficiency through its QMS, which encompasses all contributing PTS processes and work products. One of the functions of the QMS is to identify and implement key performance indicators for evaluating these processes and products. The overall aim of the QMS is to support the objective of consistently meeting verification system requirements.
50. The performance monitoring and testing framework was established by the PTS to create a culture in which quality is monitored as part of normal activities so that stakeholders, such as States Signatories and NDCs, have assurance that the Commission is in compliance with the requirements set forth in the Treaty and its Protocol. As part of this process, NDCs, which use the products and services of the IDC, meet in annual workshops to provide their feedback.
51. The 2018 NDC Workshop, which took place from 6-10 May 2018 in Algiers, Algeria was co-organized by the Government of Algeria and its Atomic Energy Commission (COMENA). The objectives of the workshop were to provide a forum for NDC experts to share experience in fulfilling their verification responsibilities and to provide feedback on all aspects of the data, products, services and support provided by the PTS.
52. Exchanges of experience and knowledge have been reached through a series of NDC Preparedness Exercises (NPEs) conducted by the NDCs and will continue in the future. NPEs represent a further advance along the learning curve for NDCs to perform their verification duties, enhancing the dialogue and cooperation between experts in the various CTBT monitoring technologies and the PTS.

## **CTBT: SCIENCE AND TECHNOLOGY 2019 CONFERENCE**

53. Mindful of the obligation under Article IV of the Treaty that States Parties cooperate with the CTBTO “in the improvement of the verification regime, and in the examination of the verification potential of additional monitoring technologies”, the CTBT: Science and Technology process was established in 2006 to engage with the global scientific and technological research community.
54. This process continued in June 2019 with the seventh in a series of biennial conferences hosted by the Commission in the Hofburg Palace, Vienna, with support from the European Union. Attendance was over 1000, with 128 oral presentations, over 575 research posters, 19 panel discussions and an opening session with high level invitees providing a political and diplomatic context. The conference provided a forum for the Commission to maintain awareness of emerging technologies relevant to CTBT verification. It explored methodologies for monitoring the performance of the verification regime and considered topics related to capacity development and the education and training of those who contribute to the installation and maintenance of relevant monitoring facilities and to data processing and analysis. It also highlighted monitoring for nuclear explosions in a global context and put special emphasis on the active participation of the CTBTO Youth Group (CYG). The event was an opportunity for the Group of Eminent Persons (GEM) to meet and discuss ways and means of advancing the universality of the treaty and its entry into force.

## **INTEGRATED CAPACITY BUILDING AND TRAINING**

55. The Commission accords high importance to training and capacity building to improve the capacity of States Signatories to effectively fulfil their verification responsibilities under the Treaty and to benefit fully from their participation in the verification regime, in particular through the use of IMS data and IDC products (for verification as well as for their own civil and scientific applications).
56. In addition to traditional training methods, information and communication technologies such as e-learning offer broader possibilities to expand and further enhance capacity building. Training and capacity building are provided to States Signatories that have access to IMS data and IDC products (around 1880 authorized users from 136 States) as well as to those that do not have access (48 States) and those that do have access but make limited use of the information.
57. The training targets a variety of audiences, namely IMS station operators, technical staff of NDCs, OSI inspectors, officials, diplomats and PTS staff. Currently, 51 e-learning modules, 32 of which are in the official languages of the United Nations, are available. Since 1999, more than 5500 NDC technical staff from 183 States Signatories were trained. The current training programme includes annually around 20 NDC and station operator events, for all four technologies.
58. The need to invest in the next generation of nuclear non-proliferation and disarmament specialists is a key driver of the education activities of the Commission. These aim to broaden knowledge of the Treaty and to develop capacities in States Signatories to

effectively confront the political, legal, technical and scientific challenges facing the Treaty and its verification regime. To achieve this objective, the Commission continued to develop its Knowledge and Training Portal, complete with issue specific training modules, a database of CTBT related resources and materials, and an archive of lectures on the Treaty and the science and technology that underpin its verification regime. The Commission is also the first security based international organization to create a free and open educational platform on iTunes U, which allows users to access and download lectures, documents and presentation files on the policy, legal, technical and scientific aspects of the CTBT.

59. The Commission also redeveloped and updated its publicly available CTBT e-learning modules and introductory CTBT tutorial using a modern and interactive e-learning framework. This set of newly developed modules will help to prepare stakeholders for the CTBTO educational initiatives, support outreach activities, and improve the CYG induction mechanism on its portal. The modules will also be utilized for awareness raising and outreach to the general public, and can be made available for incorporation into academic curricula.
60. The 2nd CTBT Science Diplomacy Symposium was held from 21 May to 1 June 2018. More than 350 participants registered to take part in the symposium, many of whom participated virtually through the CTBTO Knowledge and Training Portal. Participants came from all geographical regions of the Treaty. The symposium aimed to raise public awareness of the contribution of the CTBT to international peace and security, and to inspire cooperative and collaborative research and innovation on nuclear test monitoring science and technology. It also had a special emphasis on youth engagement, with over 40 members of the CYG taking part in the discussions as panellists or contributing to the dialogue from the audience. Many members of GEM also participated and lent their expertise to the discussions.
61. The two-week event consisted of a wide range of thematic and dynamic discussion sessions, hands-on simulation exercises, and a field trip to the Atominstitut at the Vienna University of Technology. A high level session on 25 May featured keynote speeches by an all-female panel, including Karin Kneissl, Federal Minister for Europe, Integration and Foreign Affairs of the Republic of Austria; Elba Rosa Pérez Montoya, Minister of Science, Technology and Environment of Cuba; and Izumi Nakamitsu, United Nations High Representative for Disarmament Affairs. There was also an expert dialogue on “Assessing the Current Global Security Context: Successes, Challenges, and Possible Ways Forward” with Desmond Browne, Vice-Chairman of the Nuclear Threat Initiative and former United Kingdom Secretary of State for Defence, and Michelle Ndiaye, Director of the Africa Peace and Security Programme, Institute for Peace and Security Studies and Head of Secretariat, Tana High-Level Forum on Security in Africa.
62. An information visit for government representatives from non-ratifying States was held in conjunction with the symposium. Nearly 40 government nominees from 22 non-ratifying States participated in the visit. In addition to participating in the entirety of the symposium programme, they also met with the Executive Secretary and exchanged views on issues related to possible ratification of the CTBT.

63. Building on its experience in organizing CTBT policy related courses for diplomats and emerging policy makers, as well as its engagement with the academic community, the Commission incorporated sessions and workshops on the role of the CTBT in disarmament and non-proliferation into the CTBT: Science and Technology 2019 conference.
64. Support for the United Nations Disarmament Fellows initiative continued, with a course on the Treaty hosted by the Commission in September 2018. Another course is being prepared for September 2019.

## **OUTREACH ACTIVITIES**

65. The outreach activities of the PTS aim to encourage the signature and ratification of the Treaty, enhance understanding of its objectives, principles and verification regime and of the functions of the Commission, and promote the civil and scientific applications of the verification technologies. These activities entail interaction with States, international organizations, academic institutions, the media and the general public.
66. Most interaction with States to raise awareness about the Treaty and promote signature and ratification takes place in the context of bilateral consultations and correspondence. While special emphasis has been placed on those States listed in Annex 2 to the Treaty and those hosting IMS facilities, virtually all States have been approached in the Commission's outreach efforts since September 2017. In addition to regular dialogue with Permanent Missions in Vienna and those representations based in Berlin, Geneva and New York, visits by PTS staff were conducted in a number of capitals. Consultations were also held, at all levels, on the margins of global, regional and subregional conferences and other gatherings.
67. A number of events and activities are organized by the PTS which allow for bilateral consultations with participants from both signatory and non-signatory States. For example, a regional workshop for States in the South Pacific was held in November 2018 in Melbourne, Australia, in order to facilitate efforts to complete the ratification process of several States in the region.
68. The Commission continued to take advantage of global, regional and subregional conferences and other gatherings to enhance understanding of the Treaty and to advance its entry into force and the build-up of the verification regime. The Commission was represented at meetings of the IAEA, the Inter-Parliamentary Union, the second session of the Preparatory Committee for the 2020 Review Conference of the Parties to the Nuclear Non-Proliferation Treaty, the Organization for the Prohibition of Chemical Weapons (OPCW), the African Union, the African Commission on Nuclear Energy (AFCONe), the North Atlantic Treaty Organization, the United Nations Industrial Development Organisation (UNIDO), the United Nations General Assembly (UNGA) and its First Committee, the United Nations Office on Drugs and Crime, the Parliamentary Assembly of the Francophonie, the Tokyo International Conference of African Development, and The World Academy of Science.

69. During these meetings and conferences, the Executive Secretary met with a number of heads and other senior officials of international and regional organizations including the Secretary General of the International Civil Aviation Organization, the Secretary General of the Inter-Parliamentary Union, the Secretary General of the League of Arab States, the Director-General of the OPCW, the Chair of the African Union Commission, the Chairperson of AFCONE, the Organisation for Security and Cooperation in Europe (OSCE) Secretary General, the Secretary General of the United Nations Educational, Scientific and Cultural Organization, the Director General of UNIDO, the Secretary-General of the United Nations, the President of the UNGA, the High Representative for Disarmament Affairs of the United Nations, the Chair of the Political Committee of the Parliamentary Assembly of the Francophonie and the United Nations Acting Special Representative for the Central African Republic.
70. Participation by the Executive Secretary in major events and high level bilateral talks constitutes a key element of PTS outreach efforts. These included the OSCE Forum for Security Co-operation (Vienna, Austria, February 2018); the Conference on Disarmament (Geneva, Switzerland, February 2018 and July 2019); the Munich Security Conference (Munich, Germany, February 2018 and February 2019); the fourth Conference of the States Parties to the Treaty of Pelindaba (Addis Ababa, Ethiopia, March 2018); the Preparatory Committee for the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (Geneva, Switzerland, April 2018); the Academy of Science of South Africa (ASSAf), The World Academy of Sciences Regional Office for sub-Saharan Africa (TWAS-ROSSA) and the American Association for the Advancement of Science (AAAS) Regional Workshop on Science Diplomacy (Pretoria, South Africa, May 2018); the Annual Meeting of the African Aeronautics and Space Organization (Paris, France, June 2018); the Political Committee of the Francophonie Parliamentary Assembly (Québec City, Canada, July 2018); the High Level Meeting of the General Assembly to commemorate and promote the International Day against Nuclear Tests (New York, USA, September 2018); the ninth Friends of the CTBT Ministerial Meeting (New York, USA, September 2018); the eighth Tana High Level forum on Security in Africa (Bahir Dar, Ethiopia, April 2018); the Centennial Celebration Day of the International Union of Geodesy and Geophysics (Paris, France, July 2019), and the 50th Pacific Islands Forum Leaders Meeting (Funafuti, Tuvalu, August 2019).
71. The Executive Secretary also attended several other conferences, meetings and seminars, where he gave keynote speeches or participated in panels or discussions on the Treaty. During these conferences, meetings and seminars around the world and at meetings in Vienna, the Executive Secretary met with a number of prominent figures from academia, leading think tanks and other non-governmental entities. He also attended events related to nuclear non-proliferation and disarmament convened by individual governments.
72. The PTS has continued to promote preparations for national implementation of the CTBT through its programme of legislative assistance to States on the measures to be taken in accordance with Article III of the CTBT. Model legislation and commentary have been widely distributed by the PTS and are available on the CTBTO public web site.

73. A significant portion of the outreach activities of the Commission is carried out using voluntary contributions provided by States Signatories. Among the activities conducted by the PTS on the basis of such contributions was the project facilitating the participation of experts from developing countries in technical meetings of the Commission, funding the maintenance and operation of auxiliary seismic stations in developing countries, thus enhancing the data processing capabilities and data availability for States Signatories. Voluntary contributions have also been provided for training to build capacity in developing countries and to enhance understanding of the work of the Commission with a particular focus on the young generation including the expanding CYG, applications and development of the CTBT verification technologies and the benefits accruing from membership of the Commission, including the potential benefits derived from the civil and scientific applications of the verification technologies.
74. The PTS has continued to promote the Treaty and its verification regime through interaction with States, media, civil society, educational and scientific institutions, think tanks and the general public. Using a proactive and targeted approach, public information activities generated considerable media coverage for key events such as the 2nd CTBT Science Diplomacy Symposium, and the CTBT: Science and Technology 2019 conference. Film, photography, interactive features and animations are notable characteristics of CTBTO outreach activities. The public web site and social media platforms have been further developed to reach new audiences, including the young generation, in particular in the remaining Annex 2 States. This has led to increased visibility for the Treaty and its verification regime in print, online and broadcast media worldwide. Media outreach and other public information activities have continued in the form of articles, op-eds, interviews, briefings, publications, special events, exhibitions and presentations.

## **CIVIL AND SCIENTIFIC BENEFITS OF THE TREATY**

75. There are a range of civil and scientific applications for the verification technologies of the Treaty that can benefit States Signatories. The abundance of data and products available to States Signatories can facilitate their civil and scientific activities, including, for example, natural disaster warning and preparedness, sustainable development, climate change research, knowledge expansion and human welfare. Since 2011 a total of 114 contracts have been signed, providing researchers from 26 countries free access to IMS data through the virtual Data Exploitation Centre.
76. As an example of the civil and scientific applications of the verification technologies, the Commission has agreed on terms under which IMS seismic and hydroacoustic data can be made available to recognized tsunami warning organizations. Sixteen such agreements or arrangements with fifteen countries are currently in place for which data from approximately 100 IMS stations are being sent. Tsunami warning organizations have confirmed that the use of IMS data, which are more timely and reliable than data from other sources, increases their ability to identify potentially tsunamigenic earthquakes and to issue more rapid warnings. Another example is the membership of the Commission in the Inter-Agency Committee on Radiological and Nuclear Emergencies which has 18 member organizations as well as observer organizations. The

Commission is a co-sponsor of the Joint Radiation Emergency Management Plan of the international organizations. According to the plan, in case of a radiological or nuclear emergency IMS data and IDC products may be shared through the secure IAEA Unified System for Information Exchange in Incidents and Emergencies. An agreement for cooperation between the Commission and the IAEA in this regard was signed in 2016.

## CONCLUSION

77. Since the 2017 Article XIV conference, considerable progress has been achieved in the promotion of the Treaty and the advancement of its verification regime. The call for early entry into force has continued to feature prominently in the agenda of the international campaign for nuclear non-proliferation and disarmament. The verification regime of the Treaty has moved closer to completion, further improving its operational readiness and thereby increasing the confidence in its capability to detect any nuclear explosion test in any environment.