The Comprehensive Nuclear Test-Ban-Treaty (CTBT) Progress and Achievements in Verification Science and Technologies

Lassina Zerbo, CTBTO, Vienna, Austria

Since the CTBT was opened for signature in 1996, the Preparatory Commission of the CTBTO has worked towards implementing the verification regime called for by the Treaty. As of June 28th, 2010, the number of countries having ratified the Treaty stands at 153 out of 182 Signatories. Out of these, 35 belong to the group of 44 countries whose ratification is necessary before entry into force. The Provisional Technical Secretariat (PTS) is a provisional organization and its main function of the PTS is to assist the Preparatory Commission in the establishment of a global verification regime to monitor compliance with the comprehensive ban on explosive nuclear testing.

The initial International Monitoring System (IMS) network consisted mostly of capable legacy stations (from an earlier prototype) for the seismic, hydro-acoustic, infrasound and radionuclide technologies. The IMS network was extended to the point where about 80% of the seismic networks (40 primary and 90 auxiliary stations) are now certified to IMS standards as well as 10 hydro-acoustic and 41 infrasound stations (90 and 70% complete); in addition 59 radionuclide particulate stations and ten laboratories are certified (74 and 60% complete) and 24 radionuclide noble gas stations are sending data to the International Data Centre (IDC.)

Progress has been made in the network calibration for seismic location and magnitude, surface-wave processing, and analysis tools. In hydro-acoustics, the use of the 6 hydrophone triads has been optimized. Infrasound processing has made considerable advances to the point where data from improved sensors are routinely automatically processed, reviewed and published.

CTBT verification relies on fusion of the waveform data with that from the radionuclide sensors. Over the past 10 years, the measurement sensitivity has increased for both particulate and noble gas (Xenon) radionuclides. The noble gas systems were at the prototype stage in 2000 and have improved nearly ten-fold in detection capability. Finally, the interpretation of radionuclide and waveform data requires sophisticated atmospheric transport modelling to relate the observations to a common origin.

The CTBT is ultimately verified by its Member States, and an important activity of the organization is to provide the data and tools to the States and to train their representatives to make informed decisions. The data distribution software system is being upgraded to use state-of-the-art technologies.

Efforts are also under way to build up the capacity of States with limited experience in the monitoring technologies to incite them to become fully active partners in the technical aspects of verification and to engage the academic world at large with a Science and Technology initiative with a conference scheduled for June 2011.