



## **An overview of the CTBTO monitoring system**

**L. Zerbo, J. Coyne, and F. Guendel**

CTBTO, Vienna International Centre, P.O. Box 1200, 1400 Vienna, Austria

The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) was established in 1997 to verify compliance with the Comprehensive Nuclear-Test-Ban Treaty, which bans nuclear explosions everywhere in the world. The global monitoring mission of CTBTO is performed by continuously observing seismic signals, hydroacoustic signals, infrasound signals, and radionuclide particles and gases which are transported through the atmosphere. This task utilizes a global monitoring network which consists of 50 primary seismic stations, 120 auxiliary seismic stations, 11 hydroacoustic stations, 60 infrasound stations, and 80 radionuclide stations. About 57% of the network is currently installed and processed operationally. Data from this network are transmitted to the CTBTO's International Data Centre (IDC) in Vienna, Austria, in close to real time. The radionuclide network of 80 particulate radionuclide stations and 40 noble gas stations is supplemented with 16 radionuclide laboratories, which reanalyze radionuclide samples as needed. The data availability (98%) and the data timeliness (95% of data received within 5 minutes of data collection) requirements of the network are consistent with the continuous monitoring objective of the Treaty.

Upon receipt at the IDC, the data are automatically processed using appropriate techniques, based on the technology and characteristics of each station. The automatic results take various forms, including a series of bulletins of possible events observed with the waveform technologies (named SEL1, SEL2 and SEL3), and reports of nuclides possibly observed at radionuclide stations. The results of automatic processing are subsequently interactively reviewed by analysts at the IDC, who verify and correct the automatic results. This leads to a global bulleting of events for the for waveform technology stations (named Reviewed Event Bulletin, REB) and a list of nuclides observed at each radionuclide station. The IDC also utilizes atmospheric transport modeling techniques in order to understand the possible source location of observations made with the radionuclide network. After interactive review is completed, an

event screening process is initiated which attempts to identify observations which are consistent with nuclear explosions. All raw data and results of processing (automatic and interactive) are available to the Signatories of the CTBT as soon as they become available.

The improvement of the techniques used by CTBTO is a continuous activity of the organization, and is explicitly specified in the CTBT. These improvements apply to all relevant technologies, as well as to the underlying infrastructure. Opportunities in this regard take various forms, including regular postings on the organization's web site.