



Ad hoc algorithms and methodologies for the radionuclide CTBT treaty verification

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The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization is the international organization establishing the global verification system under the CTBT, which bans all nuclear weapon test explosion or any other nuclear explosion. The verification system includes the International Monitoring System (IMS), a global network of 321 monitoring stations (radionuclide technologies: particulate and noble gases; waveform technologies: seismic, hydro acoustic and infrasound), a communications infrastructure, an International Data Centre (hereinafter referred to as the IDC) and the capability to carry out on-site inspections. To verify the treaty, the Radionuclide Monitoring needs to review data coming daily from 80 particulate and 40 noble gas stations. The big amount of data to review and the specific and sensitive task in the treaty verification led to the development of new methods and algorithms to help the Human analysis reducing the reviewing time and enhancing the quality of the results. Specific science for gamma spectroscopy has been involved and applied in ad hoc algorithms to make the automatic screening faster, consistent and scientific sound, moreover a set of special tools have been provided to the analysts to review and correct identify the daily findings. A whole package containing all those needs and algorithms has been developed at the CTBTO and is called Simulated Assisted Interactive Nuclide-review Tool (SAINT). The two major peculiarities of the SAINT are: 1) A total new approach of gamma peak finding that enhances drastically the capability to detect very small signals. 2) The usage of Monte Carlo simulated spectra for the correct Nuclide Identification A good spectrum baseline calculation is essential for the application of these ad-hoc calculations. The algorithm named “lawnmower” has been developed at the IDC.