

Summing Particulates and Noble Gas Spectra to Improve Detection Sensitivity and Reduce Statistical Uncertainty

An opportunity for improved detection sensitivity and reduced statistical uncertainty in analysis results from the CTBTO International Monitoring System (IMS) radionuclide stations might get of particular importance when dealing with special CTBT monitoring situations.

The radionuclide monitoring in the aftermath of the DPRK announced nuclear test in January 2016 triggered the development by the CTBTO International Data Centre (IDC) of a new approach based on summation of daily spectra for which the assumption can be made that they sample the same plume from a single release event. The combined spectrum is analysed using standard IDC software.

The method is implemented in a software tool prototype and handles both HPGe and beta-gamma coincidence based detection technologies.

The technique was successfully applied to improve detection sensitivity of Xe-131m in spectra from the IMS Noble Gas system RN38, Japan, following an episode of Xe-133 observations in February 2016.

The technique was then extended to data of collocated IMS particulates station for improving detection sensitivity of iodine isotopes over the time frame of interest.

The presentation emphasizes on methodological aspects of the spectral summation approach with examples on application cases. The added value of Atmospheric Transport Modelling to the new approach is also demonstrated.

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