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source location using the nuclear event zero-time

Determining the characteristics of a nuclear event source such as the source location and the event zero-time is an important subject in the Verification Regime of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). This characterization relies on the accurate analysis of the measured radionuclide data at the stations of the International Monitoring System (IMS). The radionuclide identification and activity concentration are available in analysis process. Also, the isotopic activity ratios can be analyzed when the released source of the detected radionuclides is the same. Moreover, originating from a single source is important for the detected radionuclides in the five-level samples and should be considered in event screening mechanism. This study therefore investigated the co-locating of the detected radionuclides using the isotopic activity ratios. At first, the zero-time of a nuclear event was obtained for decay chains of the detected radionuclides using Bateman equations. Then, Atmospheric Transport Modelling (ATM) using WEB-GRAPE software was used to estimate the possible source region for the detected radionuclides at obtained zero-time. Estimating the source location can be improved by considering the event zero-time at ATM calculations.

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