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Approach to Radionuclide Time Series Reconstruction Based on Autoregressive Analysis

Fragmented time series are not unusual in the radionuclide results reported by the International Data Center (IDC), especially those measured with Xe monitors. When the number of valid data (understood as over the decision limit) is high, simple interpolation methods are good enough in most cases. When the number of valid data is low, time series reconstruction offers preliminary results that can be useful for further analysis. Time series reconstruction based on autoregressive models preserves the basic statistical descriptors and allows the use advanced statistical analysis such as the Hilbert transform and cross-correlations. This methodology has been applied on the 133Xe radionuclide data available with CRTOOL for the stations RN38 (Takasaki, Japan) and RN58 (Ussuriysk, Russia) for the period January 1st 2016 to April 15th 2016, which includes the estimated date for the nuclear test performed by the Democratic Popular Republic of North Korea on January 6th, 2016. In both stations, time series based on 12-hours monitoring period provided about 50% of positive 133Xe measurements, with some results over 1 mBq/m3 for RN38 (January 6th, February 21st, March 13th & 15th) and RN58 (February 17-18th). The proposed analysis on the reconstructed time series demonstrates that these events are not correlated.

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