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Influence of atmospheric transport patterns on xenon detections at the CTBTO radionuclide network

Monika Krysta and Jolanta Kusmierczyk-Michulec
CTBTO, IDC/OD, Vienna, Austria (monika.krysta@ctbto.org)

In order to fulfil its task of monitoring for signals emanating from nuclear explosions, Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) operates global International Monitoring System (IMS) comprising seismic, infrasound, hydroacoustic and radionuclide measurement networks. At present, 24 among 80 radionuclide stations foreseen by the Comprehensive Nuclear-Test-Ban Treaty (CTBT) are equipped with certified noble gas measurement systems. Over a past couple of years these systems collected a rich set of measurements of radioactive isotopes of xenon.

Atmospheric transport modelling simulations are crucial to an assessment of the origin of xenon detected at the IMS stations. Numerous studies undertaken in the past enabled linking these detections to non Treaty-relevant activities and identifying main contributors. Presence and quantity of xenon isotopes at the stations is hence a result of an interplay of emission patterns and atmospheric circulation. In this presentation we analyse the presence or absence of radioactive xenon at selected stations from an angle of such an interplay. We attempt to classify the stations according to similarity of detection patterns, examine seasonality in those patterns and link them to large scale or local meteorological phenomena. The studies are undertaken using crude hypotheses on emission patterns from known sources and atmospheric transport modelling simulations prepared with the FLEXPART model.