

Isotopes, Ratios and Discrimination: Challenges and Opportunities

Thursday, 22 June 2023 11:20 (1 minute)

Measuring radioxenon isotopes is one of the tools used for underground nuclear explosion monitoring. Medical isotope production and reactors also release radioxenon isotopes and discrimination of these benign sources is a key research area. Four isotope ratios have been shown to be a powerful method for discrimination if the isotopes are detected. This research has examined the expected radioxenon activity concentrations at various distances for a variety of release scenarios and detecting all four isotopes was observed to be very challenging and potentially only viable for large yields or release fractions. However, three radioxenon isotopes are more detectable over a wider range and may be key to discrimination. There has also been recent interest in other isotopes, such as Argon-37, that when combined with radioxenons, can provide more robust discrimination. The scenarios that were explored will be described, and results presented on potential radioxenon detections, using current and next generation capabilities, as a function of time and distance after a simulated event.

E-mail

james.ely@pnnl.gov

Promotional text

The work presented provides context to understanding xenon signatures and discriminating them from benign sources, helping to improve nuclear explosion monitoring and the International Monitoring System.

Oral preference format

in-person

Primary authors: Mr MILEY, Harry (Pacific Northwest National Laboratory (PNNL)); ELY, James (Pacific Northwest National Laboratory (PNNL)); Mr HAYES, James (Pacific Northwest National Laboratory (PNNL)); Mr ESLINGER, Paul (Pacific Northwest National Laboratory (PNNL)); Mr SARATHI, Ramesh (Pacific Northwest National Laboratory (PNNL))

Presenter: ELY, James (Pacific Northwest National Laboratory (PNNL))

Session Classification: Lightning talks: P2.4

Track Classification: Theme 2. Events and Nuclear Test Sites: T2.4 Atmospheric and Subsurface Radionuclide Background and Dispersion