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Accounting for radioxenon interferences

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Radioxenon analysis is a critical part of monitoring for underground nuclear explosions. Algorithms that determine the activity concentration of a sample were developed over many years and continue to be updated as lessons are learned from automated radioxenon analysis systems. During Xenon International testing in the U.S., a large activity ^{133}Xe spike caused false positive hits for ^{133m}Xe and ^{131m}Xe , with similar false positive hits are expected when the metastable isotopes are present. The U.S. is developing algorithms that include interference terms for the four radioxenon isotopes and the radon daughters to reduce the biasing and false positives that are caused by large interference radioxenon spikes. The algorithms will use matrix inversion to solve the correlated interference terms simultaneously. The additional interference terms will provide radioxenon analysis that is more accurate under more conditions and will reduce the number of false positive results.

Promotional text

This work discusses a method that will improve nuclear test monitoring and verification by improving the accuracy of radioxenon analysis and is intended to disseminate the concepts to the broader monitoring community.

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