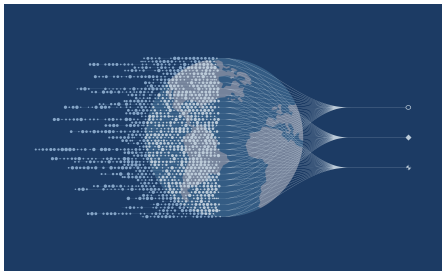

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term analysis of 127Xe from surface and subsurface tracer transport experiments of the PE1 series

The development and validation of noble gas transport models through field collected data is critical in the improvement of nuclear explosion monitoring techniques. Complex surface terrain in the area of release can drastically impact the transport of the resulting plume and the subsurface geology can alter material flow to the surface, resulting in large discrepancies in release times, complicating arrival times at International Monitoring System stations and subsequent atmospheric transport modeling analysis. To better understand these effects and provide validation data for modeling, 127Xe was utilized as a radiotracer in multiple large-scale, multi-physics field experiments of the Low Yield Nuclear Monitoring (LYNM) Physics Experiment 1 (PE1) series. Aliquots were collected from both a metrological surface release experiment (REACT) and a subsurface chemical explosive experiment (PE1-A). Release systems deployed in both experiments captured gas from the source container before experiment execution and were shipped to Pacific Northwest National Laboratory (PNNL) for post-analysis. Both surface and subsurface systems collected telemetry data related to pressures, temperatures, and flow rates of the radioxenon during release operations. Through a combination of telemetry data, laboratory spectroscopy of the aliquots, and xenon concentration measurements, the total inventory in both atmospheric and subsurface releases was calculated.

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