ID: Type: **Poster**

characteristic release of noble gases from an underground nuclear explosion

Releases of noble gases at the ground surface resulting from explosively propagated vents or large operational releases have typically been considered to be the only modes of transport from an underground nuclear explosion (UNE) which are capable of producing detectable levels of radioxenon in atmospheric sampling at significant standoff distances. For thermally and barometrically driven post-detonation transport across the broad surface of a simulated UNE site, we show that even deep, well-contained UNEs, without prompt vents or operational releases, are potentially detectable at least tens of kilometers downwind with current technology. From our simulations, we find that broad-area surface fluxes of radioxenon exhibit exponential dependence on bulk permeability resulting in order-of-magnitude enhancements of surface flux for small increases in permeability. UNEs characterized by a canonical depth-to-yield relationship generally resulted in larger atmospheric signals for shallower, lower-yield explosions allowing downwind detection at distances greater than 1000 km. Additionally, simulations suggest that atmospheric sampling at night produces detections at the greatest distances downwind.

Primary author: CARRIGAN, Charles (Lawrence Livermore National Laboratory)

Presenter: CARRIGAN, Charles (Lawrence Livermore National Laboratory)

Track Classification: Theme 2. Events and Nuclear Test Sites