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# of Nuisance Background on Source Location Models

Many source-term estimation algorithms for atmospheric releases assume there is no influence from nuisance sources. However, industrial sources result in a world-wide background of xenon isotopes (Miley and Eslinger 2023) that are also useful for detecting nuclear explosions. A large synthetic data set of atmospheric samples was developed for 384 release events with varying levels of 133Xe from small simulated nuclear explosions at eighth locations over four different time periods. In addition, synthetic data were developed based on the operation of several industrial emitters of 133Xe. A source-location algorithm (Eslinger et al. 2019) designed to find a short-duration release that is confounded by long-term nuisance sources was applied to the synthetic data set. The primary study result was determining the sample concentration levels below which the synthetic releases from the simulated nuclear explosion event were indistinguishable from background.

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