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# of a Bayesian source-term estimation model to spatiotemporal sensor resolution

Source term estimation (STE) methods calculate the most-likely source characteristics of an atmospheric release given concentration observations. The confidence in the STE depends on the time and space scales of the observations, sensor locations, and release parameters. In previous work, we developed and validated a probabilistic STE algorithm that was validated using high-resolution spatiotemporal data collected during a controlled tracer release experiment. Here, the STE algorithm receives significant improvements, which extend applicability to coarser-resolution observational datasets. Improvements include the addition of a fully-connected deep neural network model emulator with dynamically optimized architecture and more robust and resilient goodness-of-fit (GOF) metrics, used to measure the discrepancy between model and observational data. Using synthetically generated observations over East Asia, the skill of the improved algorithm is quantified over a broad range of sensor configurations and release scenarios. The evaluation is broken into three experiments. First, a validation study. Next, data-denial techniques are applied to a single release scenario over the Korean peninsula, where the skill of the inversion is shown to be highly sensitive to the number of deployed sensors but less sensitive to temporal resolution. Finally, the STE algorithm is tested for many release locations throughout the geographic model domain.

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