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Real-time turbulent plume estimation with mobile sensors THOMAS BEWLEY, CHRISTOPHER COLBURN, DAVID ZHANG, UC San Diego, JOSEPH CESSNA, SAIC, NICHOLAS MOROZOVSKY, ANDREW CAVENDER, CHRISTOPHER SCHMIDT-WETEKAM, UC San Diego — Ensemble methods for estimating turbulent fluid systems are efficient methods for quantifying uncertainties in nonlinear, high-dimensional systems. Many real-time estimation algorithms for large-scale fluid systems have been tested and validated by the weather/oceanic forecasting communities, but (generally speaking) these methods have not been used for short time-scale and short length-scale models. We present estimation results for a contaminant plume release experiment. In this experiment, a passive scaler is released at a known location in a small domain and a turbulent environment. Mobile robots are deployed to measure wind velocity and plume concentration. Measurements are assimilated to estimate the wind field and quantify the uncertainty in the estimate, which is then used to plan waypoints for future measurements.

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