

Development of a Performance Evaluation Protocol for Air Sensors Deployed on a Google Street View Car

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ABSTRACT

Performance evaluation studies for low-cost sensors (LCS) measuring air pollutants have been conducted by academic and governmental groups for stationary applications. In contrast, evaluation protocols are nonexistent for LCS used in mobile deployments, though LCS are used in this manner by research groups and may be employed to complement regulatory directives for community monitoring. Mobile measurements with LCS are a nascent but growing use-case, and questions of data quality will become increasingly important. The South Coast Air Quality Management District's Air Quality Sensor Performance Evaluation Center (AQ-SPEC) has developed the first evaluation protocol in which LCS are compared to reference- or research-grade instruments while deployed on a ground-based mobile platform. LCS are assessed in test scenarios of various degrees of environmental control, ranging from placement in a controlled-flow sampling duct to unsheltered mounting on a vehicle rooftop. The testing procedures aim to quantify the performance of LCS and the effects of sensor siting, orientation, and vehicle velocity, the results of which can guide users on appropriate LCS and configurations for their circumstances. Unexpected performance effects have been revealed through pilot-testing of this evaluation protocol that would likely have not been known from stationary field and laboratory testing.

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