

EPA Air Sensors 2014: A New Frontier

Low cost sensors: Field evaluations and multi-sensor approaches for emissions factors

Mike Bergin¹, Karoline Johnson¹, Gayle Hagler², Armistead Russell¹

¹*Georgia Institute of Technology, Atlanta, GA*

²*U.S. EPA, Office of Research and Development, Research Triangle Park, NC*

The development, and application of low cost sensors to measure both particulate and gas-phase air pollutants is poised to explode over the next several years. The need for the sensors is driven by poor air quality experienced in inhabited regions throughout the world, in both developed and developing countries, and citizen health concerns. Although a variety of low cost sensors are currently available, the performance of most sensors is currently not well understood. The necessary precision and accuracy needed depends on the application, and can vary from citizens concerned simply with whether air quality is 'bad' versus 'good' in their homes, to policy makers concerned about attainment and needing federal reference method data quality.

In this presentation we will present field evaluations of select sensors to measure particulate matter (PM) and CO₂ using relatively inexpensive components for data acquisition. We will compare measurements at relatively low PM concentrations ($\sim 10\text{-}30\ \mu\text{g m}^{-3}$) in Atlanta, to high concentrations ($\sim 100\text{-}300\ \mu\text{g m}^{-3}$) in India. We will also present results for PM emissions factors (EF: which uses the measured increase in PM per unit increase in CO₂ to determine the PM emissions per unit fuel consumed) at a roadside site in Atlanta and will discuss issues related to data analysis and interpretation. Overall, the combination of multi-low-cost sensor data has the potential to supply powerful information on the specific sources, and source strengths of pollutants in addition to yielding key information on spatial and temporal pollutant distributions.