

Comparing Particulate Pollutant Concentrations Inhaled by Bicyclists in NYC

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Columbia University's "Biking and Breathing" study in collaboration with WNYC (NYC Public Radio) investigates New York City bike commuters' exposure to particulate air pollutants and the health impact of this short-term exposure. The study consists of a target number of 150 volunteers that bike five to six 24-hour sessions over 3-4 weeks. Volunteers are expected to bike on their normal commuting routes while wearing a MicroPEM which measures Particulate Matter < 2.5 μm (PM_{2.5}) and one MicroAeth which measures Black Carbon (BC) or soot mainly emitted by vehicles. A challenge with this project lies in the MicroPEM's inability to count particles < 300 nm in diameter. Ultrafine Particles (UFP) <100 nm in diameter fall under this category, and have been found to have negative health effects due to how easily the fine particles can be inhaled. An intensive Electric Bike project consisted of participants riding on specific routes for three hours at a time, with additional monitors such as a UFP counter as well as multiple MicroPEMs and MicroAeths have been conducted. A noise meter was also included to determine potential associations between noise-derived traffic data and different types of particles. Although only one of the eight sampling sessions has been processed, we did find that PM_{2.5}, BC, and UFP shared visually similar spatial and temporal patterns. Spatially, there were lower values along the Hudson River Greenway and higher values on Spring St and at the corner of 12th Ave and Clarkson St. Temporally, there were peaks in particle concentrations from various monitors at similar times. Ratios between PM_{2.5} and BC concentrations with UFP concentrations were more steady at times with lower UFP concentrations and varied more with higher UFP concentrations.