1IA.1
Relative Contributions of Self-Pollution and On-Road-Pollution to Children's Exposure in School Buses. EON LEE, Yifang Zhu, *University of California, Los Angeles*

Previous studies have shown children are exposed to high levels of $PM_{2.5}$, black carbon (BC), and ultrafine particle (UFP, diameter <= 100 nm) inside school buses. Both surrounding vehicle emissions from the roadway (i.e., on-road-pollutions) and school bus' own emissions contribute to the exposure levels. While many studies have reported the presence of self-pollution in schools buses; the relative contributions between on-road-pollution and self-pollution is unknown. This study investigated under what conditions and to what extend self-pollution becomes more important than on-road-pollution. We estimated self-pollution rates inside six school buses and assessed the associated changes of spatial concentration distributions at increased driving speeds. The selected school buses include a wide range of model year, passenger capacity, cabin volume, and engine/exhaust tail-pipe locations. We measured the number concentration and size distributions of UFPs, $PM_{2.5}$, BC, CO_2, and CO levels concurrently in and out of school buses. In-cabin measurements were conducted at breathing zones in the front, center, and back of school buses. Statistical regression analyses were conducted to estimate self-pollution rates for UFPs, $PM_{2.5}$, and BC. This study found high self-pollution rates of UFPs, $PM_{2.5}$, and BC in the school buses. On local streets, self-pollution makes in-cabin/on-road concentration (I/O) ratios as high as ~1.5 for UFPs and slightly less for $PM_{2.5}$ and BC. In comparison, on freeways, the I/O ratio was ~1.0 because of high air exchange rates and the infiltration of high-concentration of pollutants. Self-pollution dominates spatial concentration distributions of in-cabin pollutants. The spatial concentrations were substantially decreased at all three monitoring points at high driving speeds due to increased air exchange rates. The findings in this study suggest that self-pollution in school buses depends on self-pollution source strength, ambient concentration, and driving speed.

1IA.2
Commuters' Exposure to PM2.5 and CO2 in Metro Carriages of Shanghai Metro System. HAO GU, Bin Xu, *Tongji University*

A comprehensive measurement campaign was conducted to examine the commuters' exposure to PM2.5 (diameter<=2.5 micro-meter) and CO2 in metro carriages under different conditions. The average PM2.5 and CO_2 concentrations inside all the measured five metro lines were found to be 0.084 ± 0.042 mg/m^3 and 1253.1 ± 449.1 ppm (parts per million), respectively. The factors that influence the PM2.5 and CO_2 concentrations were quantitatively investigated. The in-carriage PM2.5 concentrations are greatly affected by the ventilation systems, out-carriage PM concentrations and the passenger number. The largest in-carriage PM2.5 and CO_2 concentrations at 0.132 mg/m^3 and 1855.0 ppm were observed inside the carriage equipped with the oldest ventilation systems. The average PM2.5 and CO_2 concentrations increase up to 24.14% and 9.93% as the metro driving from underground to overground. The average in-carriage PM2.5 and CO_2 concentrations increase 17.19% and 26.97% as the metro drives from urban to the suburban area. It was observed that PM2.5 concentration is proportional to the on-board passenger number at a ratio of 0.0004 mg/m^3 per passenger. A mathematical model that incorporates all the above parameters is established to estimate the in-carriage PM2.5 concentration.

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