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# Quantifying the effects of vehicular driving cycles on air quality

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Transportation is one of the primary sources of air pollution and GHG emissions. On-road mobile sources account for a third of the total air pollution in the US. Furthermore, the type of analysis and the level of detail utilized (macroscopic or microscopic) to calculate traffic emissions affect the results extensively. Traditional methods for creating emission inventories utilized annual average estimates. Instead, travel demand models were utilized to provide an intermediate level of detail using daily values. Currently, more accuracy has been established using microscopic analyses through the reduction of time and distance scales and utilizing second-by-second operations. The need to accurately quantify transportation-related emissions from vehicles is essential. The latest United States Environmental Protection Agency mobile source emissions model, MOVES can estimate vehicle emissions on a second-by-second basis creating the opportunity to integrate it with a microscopic traffic simulation model (VISSIM). This research analyzed different levels of detail for predicting emissions from vehicles and shows how the various approaches affect predicted emissions of CO, NOx, PM and CO2. The results demonstrated that vehicle activity characterization in terms of different driving behaviors was shown to have a significant impact on air quality. Specifically, emission rates were found to be highly sensitive to stop-and-go traffic and the associated driving cycles of acceleration, deceleration, and frequent braking/coasting and idling. Obtaining accurate and comprehensive operating mode distributions on a second-by-second basis is essential for predicting emissions. The proposed emission rate estimation process can provide policymakers with more accurate information when deciding on environmental transport policies for air pollution control.

## Biography

Hatem Abou-Senna is an Assistant Professor and the Transportation and Air Quality Program Director for the Transportation Center (CATSS) at UCF. He holds Bachelor and Master Degrees in Civil Engineering from Cairo University as well as Masters and PhD degrees in Transportation Engineering from UCF and has been a registered as Professional Engineer in Florida since 2006. He has over 20 years of experience in traffic engineering and transportation planning. He specializes in microscopic traffic simulation, transportation modeling, traffic impact studies & transportation air quality impacts. He has published over 30 peer-reviewed journal and conference papers.

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