

Anthropogenic Drivers of Neighbourhood-Level Carbon Dioxide Emissions in Montreal

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Few studies explore how the built environment affects carbon dioxide emissions both directly, through reduced carbon sequestration capacities, and indirectly, through population travel behaviour. This thesis takes advantage of a unique opportunity to compare high-quality neighbourhood-level CO₂ data to travel behaviour along an urban-suburban-exurban gradient in Montreal. It interprets CO₂ observations collected for the Environmental Prediction in Canadian Cities (EPiCC) Project in light of urban travel trends computed from the Agence Métropolitaine de Transport's 2003 Origin-Destination Survey. Factor analysis is used to group census tracts sharing similar urban form and demographic composition such that urban, suburban and exurban travel behaviour can be compared to CO₂ concentrations and fluxes from these different neighbourhood types. Although mature suburban and exurban neighbourhoods were found to be effective daytime carbon sinks in the summer, their inhabitants use more carbon-intensive modes of transportation. As a result, urban neighbourhoods less capable of sequestering carbon measure higher levels of CO₂ despite showing greater use of public and active transport. These findings suggest that transportation policy reform targeting suburban and exurban travel behaviour may be a key step toward achieving the carbon-neutral city.

Summer Diurnal CO₂ Flux at the Three EPiCC Sites

