



Carbon dioxide fluxes in a suburban area of a North American City

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Measurements of surface-atmosphere fluxes of carbon dioxide (F_{CO_2}) in urban environments are rare even though cities are an important source of atmospheric CO_2 . As part of the Baltimore Ecosystem Study, eddy covariance instrumentation is mounted at 41.2 m to continuously measure earth-atmosphere exchanges of carbon dioxide at the local scale in a suburban environment in Baltimore, MD. Several features make this research unique: 1) for an urban area, the study site is extensively vegetated, 2) the period of record (2001-2005) is among the longest available for urban F_{CO_2} measurements, 3) both closed-path and open-path infrared gas analyzers are used for observations, and 4) several unique data quality control and gap-filling methods are developed for use in an urban environment. Additionally, detailed surface datasets and GIS software are used to perform flux source area analysis. F_{CO_2} is found to be very dependent on source area land-cover characteristics, particularly the proportion of vegetated and built surfaces in the source area. Over the course of a year, the urban surface is also found to be a strong net source of CO_2 , though there is considerable inter-annual variability depending on environmental conditions (e.g. average temperature, total precipitation, cicada infestation). During the growing season, there is net uptake of CO_2 by the surface, but this uptake is less than in forested areas and is not enough to offset CO_2 emissions for the entire year.