Analysis of the Effect of Vegetation on Urban CO_2 Gradients

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Urban centers are large contributors to the world's air pollution. As carbon dioxide levels rise and urbanization increases, it becomes crucial to understand how cities contribute to an area's carbon flux. Through the study of tree ring composition, it is possible to obtain a localized historical record of an area's fossil fuel-derived CO_2 levels. By measuring the ^{14}C isotopes of carbon in tree rings, it is possible to reconstruct an area's anthropogenic CO_2 history. While previous studies have assessed the effects of increased CO_2 levels on plant biota, the ability of trees to provide a localized record of carbon flux is still in question. Furthermore, the effect of surrounding vegetation on an individual tree's records is unclear. In this study we measured current carbon dioxide levels in Central Park and Harlem—two highly urban areas in New York City with different vegetation densities—over a twenty-month period to determine variations in CO_2 levels. We found that Harlem had consistently higher and less stable carbon dioxide concentrations than Central Park, and that they occurred on daily cycles.

Further studies will analyze the ^{14}C records of two red oak (*Quercus rubra*) trees—one in Commodore Barry Park, a highly industrialized, concrete-heavy area downwind from Manhattan, and the other in Forest Park, a densely vegetated park in Queens—over a sixty-year period to explore how the tree-ring record responds to different surrounding vegetations over time.