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## Informing urban greenhouse gas quantification and mitigation using high-resolution CO<sub>2</sub> emissions: a case study in Baltimore, USA

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As atmospheric carbon dioxide (CO<sub>2</sub>) levels continue to rise, a global effort to mitigate greenhouse gas (GHG) emissions is underway. Urban domains, which are responsible for more than 70% of global anthropogenic CO<sub>2</sub> emissions, are emerging as leaders in mitigation policy and planning – especially in the United States of America (US), which has formally withdrawn from the Paris Agreement. However, cities face obstacles in developing comprehensive and spatially explicit GHG inventories to inform specific actions and goals. The Vulcan emission product provides highly resolved Scope 1 fossil fuel CO<sub>2</sub> (FFCO<sub>2</sub>) emissions in space and time for the entire US, while the Hestia emission products utilize even more granular spatiotemporal data within four US urban domains. Here, we present results from Hestia for Baltimore – a colonial-era city on the Atlantic Coast of the US. Scope 1 FFCO<sub>2</sub> emissions are dominated by energy consumption in buildings, onroad vehicle emissions, and industrial point sources. Large, systematic differences exist between Hestia and Baltimore’s self-reported GHG inventory, which follows the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC). These differences include entire sectors being omitted from emissions reporting due to a determination of ownership (e.g. Scope 1 vs. Scope 3), data gaps and limitations, and a conflation of Scope 1 and Scope 2 electricity production emissions. Urban planning may be better informed by utilizing additional data sources on fuel and energy consumption – especially fuel and energy that are not provided by a centralized utility – to develop comprehensive GHG emission estimates.