Variable Methane Fluxes from Natural and Managed Ecosystems Across the New York Metropolitan Area

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The natural biogenic methane fluxes of urban areas are often ignored in regional modeling studies. Lawns, natural grasslands, and wetlands all have small but significant fluxes when scaled over their total area. We measured methane surface-atmosphere fluxes for a variety of grassland-type ecosystems around New York City using a portable chamber and gas analyzer during summer 2022. We sampled across an urban to rural gradient of lawns and grasslands and sampled at both an active gas-capture and a passively managed landfill. Lawns that are more shaded by trees and buildings and are less managed (termed 'unmanaged lawns') take up methane at greater rates than those lawns that experience prolonged direct sunlight, high temperature, and high levels of management (termed 'hot lawns'). Hot lawns are also an occasional source of methane in high temperature and drought conditions. Surprisingly, the meadows that have been developed above capped landfills (that closed decades before) take up more methane than many of the non-landfill hot lawns. Lawns cover over 94 km^2 of developed area in New York City. Careful management of these lawns could encourage increased seasonal uptake of methane to offset some of the anthropogenic methane emitted around the City.