**Seasonal Drivers of the Carbon Budget in Lake Erie's Western Basin**

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The Western Basin of Lake Erie is highly eutrophic and subject to seasonal harmful algal blooms (HABs), largely driven by nitrogen and phosphorus runoff from the surrounding landscape. While the phosphorus and nitrogen dynamics in Lake Erie have been extensively studied, this region is also a likely hotspot for carbon transformation. To investigate the seasonal and spatial variability in inorganic and organic carbon budgets, we completed three field surveys, in spring, summer, and fall on a transect across the Western Basin from the Maumee River to South Bass Island. In all three surveys we observed higher spatial variability of dissolved inorganic carbon, dissolved organic carbon, and particulate organic carbon within 11 km of the Maumee River mouth relative to sites outside of Maumee Bay, driven by pulses of direct riverwater carbon, steep nutrient gradients, and patchy bloom conditions. Seasonal variability was also greatest within Maumee Bay, with the highest river discharge in June adding particularly large amounts of dissolved inorganic carbon and spurring $pCO_2$ flux out of the water at sites where the Diatom bloom had not yet transformed the carbon. In August, when and where we observed a dominantly Microcystis bloom, particulate organic carbon increased in concentration and dissolved organic matter chemistry indicated more fresh algal sources. In October, Chlorophyll a concentrations and oxygen saturation were lowest, indicating the seasonal slowdown in productivity, and river discharge is the lowest, resulting in minimal terrestrial input and the lowest observed total carbon. Outside of Maumee Bay seasonal and spatial carbon budget dynamics are much more seasonally stable, but some variation was observed closer to South Bass Island where there is more riverine input, highlighting the importance of riverine inputs on lake carbon budgets.